

Honolulu Rail Transit Project

Public-Private Partnership Development Program Recommended Program Structure



Honolulu Authority for Rapid Transportation
City and County of Honolulu

July 13, 2018

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Executive Summary

This White Paper provides background, analysis and recommendations for the Honolulu Authority for Rapid Transportation (HART) and the City and County of Honolulu (City) to complete construction and operate and maintain the Honolulu Rail Transit Project (H RTP) under a public-private partnership (P3) arrangement among HART, the City and a P3 partner.

Based on a comprehensive analysis and critical evaluation, the recommended project delivery approach for the H RTP described in this White Paper is based upon a simplified P3 structure, which is more appropriate for a project currently underway compared to the complex and intricate P3 arrangements that are better suited to a new project. The structure uses a design-build-finance (DBF) approach for the design and construction of the remaining civil works elements of the project including the City Center Guideway and Stations (CCGS) and the Pearl Highlands Garage and Transit Center (PHGTS), and uses a 30-year operating and maintenance (O&M) agreement for both systems elements and non-systems facilities within the project. This “DBF/OM” structure, customized to the unique conditions of the H RTP, is compared in this White Paper to a nominal design-build approach for civil works under HART, and with full systems and facilities O&M provided by the City under an arrangement as mandated by Charter Amendment 4.

This analysis is intended to provide a basis for the City and HART to review and assess undertaking the remaining project elements in conjunction with a P3 partner, and to better understand the risks and benefits of changing delivery method from design-build by HART with independent and unlinked O&M by the City, to a DBF/OM package that links the capital and operating elements of the H RTP in a long-term bundle. The primary goals of this analysis include: (1) assuring cost and schedule certainty; (2) reducing the inherent public risks of designing, building, operating and maintaining the system over the long-term life cycle of the project, including a capital asset replacement program to maintain state of good repair; and (3) generating strong competition for the construction and long-term operations and maintenance of the project among experienced, world-class companies. This is an approach used successfully for transit projects around the world, especially in those situations where the project represents a community’s initial experience with a new technology and where the responsible public authorities have limited experience in managing a large and complex program.

The commercial feasibility assessment included review of comparable projects, detailed evaluation of the capital and operating costs and funding and financing options for completing the H RTP, and a comprehensive risk assessment involving staff and outside experts in risk mitigation. The risk assessment provided the analytical underpinning of the analysis and was employed to support forecasts of potential risks and mitigation strategies associated with either continuing with traditional design-build delivery or altering course by utilizing a project delivery strategy involving an alliance with a private sector partner.

P3 Program Recommendation: Key Elements

Based on the comprehensive analyses undertaken and an objective review of risks and potential mitigations, staff recommends using the DBF/OM delivery approach to complete construction and operate and maintain the Honolulu Rail Transit Project. This recommendation is based on several key elements:

- **DBF/OM structure:** The recommended DBF/OM structure for the H RTP is predicated on a joint HART/City procurement. This is necessary since HART maintains responsibility for design and construction of the system and the City assumes responsibility for all O&M, with distinct revenue and funding sources for the capital and operating/maintenance elements of the program. The procurement will invite offerors to propose on a 30-year development agreement, with individual and transparent cost proposals for civil works and for O&M. This will assure that pricing for construction and operations can be evaluated independently. The magnitude of the package is expected to attract world-class bidders and the competition will likely spur aggressive pricing by the offerors.
- **Schedule:** Reflective of the fundamental incentives embedded in a P3 development agreement with private financing, civil works and long-term operations and maintenance, the risk analysis projected a probability that the DBF/OM delivery approach could result in the Revenue Service Date occurring slightly earlier than would be the case with a separate design-build and O&M procurements. This schedule acceleration is due to construction innovation and efficiency and parallel testing and commissioning, enhanced by financial incentives for early completion, which together compensate for a longer procurement period for a P3 contract than a design-build contract.
- **Cost reduction:** Modest cost reductions are also projected to occur under the P3 approach when compared to design-build delivery, based primarily on a combination of more competitive pricing and increased efficiency. In year-of-expenditure (inflated) dollars, the DBF/OM delivery approach is estimated to be about \$360 million lower in total cost over the 30-year term than the design-build approach. This projected cost reduction is an outcome of the risk assessment, showing the City saving over \$310 million in operating costs over the 30-year term (primarily forecast for the years 2030-2050, once the current Core Systems Contract has terminated), and HART saving about \$50 million in construction costs for CCGS and PHGTC compared to the design-build approach.
- **Fiscal and schedule certainty:** Equally important as the projected cost savings and schedule acceleration is the fiscal and schedule certainty that is integral to the approach recommended for the H RTP. Under the recommended approach, the P3 Partner will have financial incentives and performance requirements to meet the pre-established budget and schedule for completing the project.

- **Efficient financing:** The P3 partner will finance the construction works over the period between 2020 and 2030, using a private capital structure with potential to be more efficient than public financing. The P3 partner will likely draw funds from its credit sources only when needed to bridge construction financing requirements. Unlike more traditional or “greenfield” P3 structures, the recommended HRT approach envisions little or no need for long-term financing or equity to remain in the project after the sunset of the local revenue sources in 2030. This capital structure would not require long-term, high cost equity returns to investors, saving significant project resources. In addition, using private financing would reduce the City’s need to incur bonded indebtedness by over \$500 million.
- **Project performance:** Under the DBF/OM, payments to the P3 Partner will be structured to match both costs incurred and revenue available to HART for capital works. A significant share of the payments will be made over a 5-year window after substantial completion (2025-2030), thus providing incentives for on-time and on-budget completion and, importantly, for assuring project performance and reducing financing costs. Other financial requirements will be included in the P3 development agreement to assure effective long-term operations, maintenance, and capital asset management and replacement over the 30-year agreement term.
- **Risk transfer:** A key attribute of the P3 approach is the transfer of much of the interface risk from the City and HART to the P3 Partner, reducing the need for management and construction oversight staffing and eliminating the requirement for both HART and the City to serve as the integrator/interface manager for numerous contractors.
- **Core Systems Contract:** Efficiencies will be achieved by placing two aspects of the existing Ansaldo Honolulu Joint Venture (AHJV) Core Systems Contract under the P3 Partner. Since the period of performance for the O&M aspects of the Ansaldo contract no longer applies owing to schedule changes for interim and full operations, a HART/City team will need to renegotiate the Core Systems Contract. Ideally, the installation of systems within the City Center Guideway segment and interim and full operations/maintenance over the initial 10 years of system operation will be the responsibility of the P3 Partner, with Ansaldo reporting to the P3 Partner rather than HART and the City, assuring improved coordination and integration and resulting in schedule acceleration and cost efficiencies. Ansaldo’s contractual requirement for rolling stock acquisition, signaling, traction power, communications, and testing and commissioning, as well as its work on the Western Segments and the Rail Operations Center, will remain under HART control.
- **Federal Transit Administration:** In June 2018, the Federal Transit Administration (FTA) issued the new Private Investment Project Procedures (PIPP) which encourages FTA grantees under the Capital Investment Grant program to create incentives for greater private sector involvement in the delivery of transit projects, including the use of public-private partnerships. PIPP formally recognizes that partnering with the private sector can accomplish the following objectives for transit authorities and local project sponsors:

- Accelerate project development
- Attract private investment
- Exercise flexibility in project management
- Incorporate innovation
- Improve efficiency

Based on the guidance embedded in the PIPP rulemaking, employing a P3 approach may have significant potential for HART and the City to address a variety of potential cost and schedule risks documented by FTA and its Project Management Oversight Consultant (PMOC) in the recent Risk Refresh Report provided by FTA to HART. The FTA is not required to approve or sign off on a project delivery decision, which is typically considered a local decision to be made by the grantee. The FTA's interest in a delivery decision only comes into play when the decision affects the terms and conditions of the FFGA, such as a significant project delay, a requirement for additional funds, or a change in the scope of the approved project.

Risk Assessment

The analysis leading to the above recommendation considered the range of risks inherent in both continuing with traditional design-build delivery and in implementing the DBF/OM delivery approach outlined above. The risk assessment model provided an indicative and probabilistic forecast of cost and schedule impacts and comparative outcomes associated respectively with each of the alternative delivery methods. Models are driven by assumptions, and assumptions are generally derived from a consensus of opinions representing a variety of perspectives. The metrics and quantitative outputs should therefore be used to support informed decision-making with the recognition that risk exists throughout the process of designing, building and operating major infrastructure projects. Strategic planning for mitigation at early stages of project delivery is the best solution for risk reduction.

As is commonplace with major infrastructure programs undertaken around the world, there are risks associated with every potential project delivery method. There is no guarantee that one method is consistently better than others. The context and unique circumstances of every project and obligates a regime of continuing vigilance in procurement, construction, operations, and state of good repair – regardless of the method of delivery.

The following is a summary of the risks and potential mitigation strategies for both design-build delivery unlinked to operations and maintenance, and for integrated DBF/OM delivery. The body of this White Paper contains a comprehensive description of the process used to identify and assess respective project delivery risks and mitigation strategies.

It is important to recognize that many potential risks result in substantially undifferentiated outcomes with respect to impact on schedule and cost for both DB and DBF/OM. For example, if a natural disaster or a “force majeure” event occurred during construction and affected schedule and hence cost, HART would be responsible for resulting impacts on the project, whether delivered using DB or DBF/OM.

Risks and Mitigation Strategies Associated with Design-Build Delivery and Unlinked Operations and Maintenance

- **Potential for lack of high quality competition:** With conventional design-build delivery, there is substantial risk that top-tier contractors will avoid bidding owing to the isolation of Honolulu and the substantial mobilization and demobilization costs associated with assembling a team. The HRTTP has experienced difficulties in attracting strong competition since inception of the project, and there is a relatively high probability to expect similar results with the City Center Guideway and Stations design-build contract. Lack of competition generally leads to a higher pricing. A potential mitigation strategy could include combining the currently separate contracts for CCGS and the Pearl Highlands Garage and Transit Center into a larger construction package. A larger contract may attract greater competition.
- **Potential for cost escalation and change orders:** Under design-build delivery, the contractor typically accepts cost/schedule risk for negligence, delays, substandard works, and items directly under the contractor's sole control. However, the design-builder does not control the entire process and basic "interface risk" among contractors is retained by the owner. This lack of risk transference often results in serial change orders and cost increases accruing to the owner. For example, if a minor contractor on the project is negligent in meeting deadlines and delays progress, the design-build contractor may allege a basis for a delay-based change order. The primary mitigation for this issue is to attempt to place minor contractors as direct subcontractors to the design-builder, a process that many design-build contractors will not accept unless significant cost is added to the pricing as a function of increased risk.
- **Potential for reduced coordination between civil contractors and systems contractors:** Under a design-build contract covering basic civil works, the systems work (e.g., installation of electrification, signaling and communications systems, etc.) is separate and not under control of the primary design-build contractor. This could result in scheduling inefficiencies and potential delays. The owner can partially mitigate this risk by increasing field supervision and oversight by adding field staff and construction integrators, requiring additional staffing. However, this approach could result in additional retained risk for HART/City, should such oversight result in re-direction of contractor activities.
- **Potential for higher operations and maintenance pricing:** Under the design-build scenario, operations and maintenance would be independent from the capital facilities construction. The City would be required to negotiate with the current Core Systems Contractor, AHJV, since the terms and conditions of the original Core Systems Contract are no longer applicable owing to changes in the project schedule. There is a risk that the result of such a negotiation would be maintaining existing pricing for the first ten years of operation, noting that the City initially selected AHJV even though its pricing for the operations and

- maintenance elements of the program was significantly higher than the prices proposed by the other two bidders in 2011. There is a further risk that O&M pricing beyond the term of the Ansaldo contract, which would end in 2030 under the current contract terms, could also be higher owing to continuation of policies and practices locked in over the initial 10 years and the need for a potential new contractor to include in its pricing a transition of responsibility. The City could potentially mitigate this risk by contracting with an external operating company for a long-term O&M arrangement, which could achieve more aggressive pricing by offering a longer-term operating contract.
- **Potential for unsuccessful negotiation with Core Systems Contractor:** This is a risk that applies to both the design-build delivery approach as well as to the DBF/OM delivery approach. In order to result in the most optimal outcome, both approaches are dependent upon the City, HART and Ansaldo coming to beneficial terms on restructuring the current Core Systems Contract for interim and full-scale operations. Successful mitigation requires engaging in a positive negotiation with Ansaldo and arriving at an outcome that is advantageous to HART for the systems installation activities and to the City for operations and maintenance.
 - **Potential for lack of preparedness to undertake rail operations and maintenance:** Many transit authorities and local governments that undertake oversight, management and operations of a new technology – particularly a specialized and proprietary technology – determine that they may be unprepared for various aspects of managing the operation of the systems and facilities that comprise the integrated system. This is especially true in the case of HRTTP, as initially there will be a requirement for the City to oversee Ansaldo’s operations. Perhaps more important is the risk related to potentially retaining a new operator in 2030, which could create a significant “learning curve” on the part of a new operator potentially replacing Ansaldo. The new operator would likely add a risk premium to its cost for assuming operations and maintenance of a proprietary technology or may not be willing to accept certain liabilities. The mitigation approach could involve bringing the new O&M contractor aboard prior to the conclusion of Ansaldo’s contract. However, this approach would necessitate additional cost to the City.
 - **Potential for lack of coordination and collaboration between HART and the City:** There are few public transit delivery environments that have a bifurcated structure between responsibility for capital construction and responsibility for operations and maintenance. Charter Amendment 4 placed a significant burden on the parties to work closely together under an overall “steering committee” approach to assure that no issues that connect construction and operation fall through undefined cracks. This is also a critical risk, which is likely exacerbated under a design-build approach with construction and operations unlinked. Under a DBF/OM delivery approach, a highly experienced, world-class partner with vast experience in both civil works and transit operations and maintenance would have strong financial incentives and performance requirements to provide the “bond” between quality construction of both civil and systems works and subsequent long-term operations

and maintenance requirements. If a separate design-build and unlinked O&M contract is selected, a much stronger, more positive and highly productive relationship must be cemented between HART and the City to replace the bridge between construction and operations otherwise represented by a P3 partner under a DBF/OM delivery model.

Risks and Mitigation Strategies Associated with Design-Build-Finance/Operate Maintain

- **Potential for protracted and costly procurement process:** Procuring a P3 partner and executing a comprehensive development agreement will take longer than procuring a design-build contract, owing to the addition of private finance requirements and the incorporation of the life-cycle aspects of the long-term operations and maintenance component in the development agreement. The current estimate is that procurement under DBF/OM will add approximately four months to the schedule as compared to design-build, but there is a risk is that the process could take even longer should pre-contractual negotiation with short-listed bidders require more time than estimated. The best mitigation for this risk is for procurement documents and the draft concession/development agreement and related materials to be carefully and comprehensively prepared by experienced advisors and supported by knowledgeable project staff. HART, working closely with the City, must assure that sufficient time and money is allocated for expert transaction coordination and management, reinforced by competent legal and financial advisors.
- **Potential for schedule delays owing to property acquisition and other factors controlled by the owner:** While this risk is one that can accrue regardless of project delivery method, there is a risk that project delays beyond the control of the P3 partner under DBF/OM delivery could result in higher financing costs owing to the “quality spread” between the cost of capital (debt service) for private finance as compared to the cost of capital for public finance. Because it is anticipated that the private finance scenario would entail a more flexible capital structure where debt is drawn down by the P3 partner only when needed for bridge financing, there may be little effective difference in interest cost incurred between public bonds and private drawdowns from established credit facilities used by major P3 contractors. Nonetheless, the risk of increased financing cost exists and could result in additional project cost. At a rate spread between the cost of public and private finance assumed conservatively to be about 150 basis points, and assuming the maximum debt that may be outstanding during the height of the construction period to be about \$850 million, this cost could be around \$1.06 million per month.
- **Potential for pricing by DBF/OM bidders to exceed HART’s “affordability cap:”** HART receives a variable stream of revenue from GET and TAT collections, as well as from the federal Capital Investment Grant Program. After allocating a substantial portion of this revenue to the non-P3 elements of the project and including debt service on outstanding bonds, a finite revenue stream exists to allocated to the P3 partner for design and construction of the City Center Guideway and Stations and Pearl Highlands facilities, as well

as related financing costs. This finite amount is referred to as the “affordability cap.” There is a risk that DBF/OM bidders will price the DB portion of the works above the affordability cap when including the costs of private finance. While the probability of this risk is low due to the inherent flexibility expected for private financing, it remains a possibility to consider. The primary mitigation is to revert to a “DB/OM” structure where public finance would be used rather than private finance. In this case, the DB/OM contractor would receive milestone payments from HART similar to a DB delivery approach.

- **Potential for operations and maintenance pricing to exceed nominal expectation:** This is a risk for the DBF/OM delivery just as it is for DB, but to a lesser degree. The difference is that in DB delivery, there is no linkage between the capital construction and operations and maintenance elements of the project. Based on experience in virtually all similar transit P3 projects, packaging a substantial construction element with a substantial long-term O&M element typically creates an incentive for bidders to “sharpen their pencils” in pricing both the DB and O&M aspects of the program. Nonetheless, a risk remains that DBF/OM bidders may overprice the 30-year O&M regime owing to concerns regarding unknown future risks. This prospect, however, is considered unlikely; the long-term O&M contract opportunity and the presence of strong competition should ideally induce aggressive bidding rather than conservative bidding.
- **Potential for the need to replace the long-term O&M operator in mid-contract:** There is a risk that the selected P3 partner could encounter difficulties or be unable to meet the rigorous performance requirements for operations and maintenance set forth in the P3 development agreement during the course of its 30-year concession. Should this circumstance occur, the question arises regarding the ability of the City to replace the P3 partner mid-stream. The recommended P3 structure for H RTP is intended to make the replacement of the contractor less complex than in typical P3 arrangement. Many P3 programs require that the P3 partner leave substantial equity in the project as a means of using “skin the game” to assure performance. This approach is becoming significantly less prevalent, since there are several methods of assuring performance that are much less expensive than paying high-cost equity returns to investors. In more traditional P3 arrangements, should the P3 contractor perform poorly and be unable to appropriately cure defective performance, a cause-based termination could result in the P3 partner losing its equity. The structure recommended for H RTP does not rely on the P3 partner leaving equity in the project, and instead relies upon methods such as O&M performance bonds, letters of credit, or parent company guarantees to assure contractor performance as set forth in the development/concession agreement. While there is always owner risk associated with terminations, the mitigation strategy for possible midterm replacement of the O&M contractor is embedded in the capital structure of the H RTP financial arrangement.

The assessments and analytics utilized to compare the two delivery approaches are detailed in the body of this White Paper. Any determination of cost savings, schedule reduction, risk reductions, and other comparative statistics are based on projections, forecasts, and the experience of other P3 transit projects. The actual determinant of the efficacy of the recommended DBF/OM approach will be a function of the marketplace. Cost and schedule estimates are merely indicative of the pricing actually proposed by potential P3 bidders.

Introduction and Background

The planning, design and construction of the Honolulu Rail Transit Project (H RTP) was approved by the voters of the City and County of Honolulu in a 2008 City Charter Amendment. The H RTP is an automated, driverless, elevated urban metro transit system spanning a 20-mile corridor between East Kapolei and Ala Moana Center, via the Daniel K. Inouye International Airport and Downtown Honolulu. The system has 21 stations along the route and will be fully integrated with Oahu's extensive bus system. When the system is fully operational, it is estimated that more than 120,000 passenger trips will be taken every weekday. The Honolulu Authority for Rapid Transportation (HART), created by Honolulu voters in 2011, is the agency responsible for constructing the system. In accordance with a Charter Amendment passed in 2017, the City and County of Honolulu will be responsible for the system and facilities operation and maintenance. As segments of the system are tested and commissioned they will be opened for revenue service between 2020 and 2025.

To date, about 10 miles of the elevated guideway in Western Oahu, as well as the Rail Operations Center (ROC) near Leeward Community College, have been constructed. The first segment of the East Section, Airport Guideway and Stations (AGS), is currently in construction between Aloha Stadium and Middle Street, comprising 5.2 miles of elevated guideway and 4 stations. In addition, a separate utilities relocation contract for the City Center segment (CCUR) has been awarded. The initial two train sets have been delivered by the Core Systems Contractor and systems components have been procured and installed along the constructed portions of the guideway. Interim operation between East Kapolei and the Aloha Stadium is scheduled to commence by the end of 2020, with full operation to Ala Moana by late 2025.

The total capital cost of the overall system, estimated at \$8.165 billion excluding financing, is funded through a combination of local and federal sources. A surcharge on the General Excise Tax (GET) and an allocation of the Transient Accommodations Tax (TAT), together with a \$1.52 billion Capital Investment Grant from the Federal Transit Administration (FTA), comprise the capital sources. Both local tax supplements sunset on December 31, 2030. The City will provide an operating subsidy to cover all O&M costs, as is presently the case for Oahu's bus system and paratransit services.

Project delivery to date has been through a combination of traditional design/bid/build and design/build contracts. Previous lawsuits, schedule delays, increased costs of construction, and a variety of other factors have contributed to project cost escalation and schedule delays since the inception of the project. Over the last year, HART staff and consultants have explored alternative methods to complete the project and manage system operations and maintenance by implementing a project delivery approach that imparts fiscal and schedule discipline, transfers risk from HART and the City to a potential private project partner and reduces the requirement for the City to hire new staff to oversee the management and operations of the rail system.

Alternative Delivery Approach

In partial response to the increased costs of the H RTP and the delays which the project has experienced, HART has reviewed and studied various alternative approaches to project delivery, some of which involve significant risk transfer to private partners in sharing cost, schedule and financing risk in completing H RTP construction. These partnerships also transfer risk and responsibility to the private sector for operating and maintaining the system and providing asset maintenance and replacement under a long-term contractual arrangement. This approach has been undertaken by numerous major transit projects internationally, and, more recently, in the United States. These include the Eagle P3 Project in Denver, a commuter rail line connecting the Denver Airport with Downtown Denver Union Station recently opened to full revenue service; the Purple Line in Maryland, connecting the commuter suburbs of Bethesda, Silver Spring and College Park to the Washington DC Metro System, currently under construction; and most recently the automated, elevated rail system connecting Los Angeles World Airport with the LA Metro rail and bus systems. Each of these project delivery examples, as well as numerous similar transit programs around the world, have projected meaningful cost savings over conventional methods of project delivery, most notably with respect to long-term savings in the cost of system operations and maintenance.

Over the last 10-20 years, the infrastructure industry and financial markets have moved together to create new methods of delivering major projects in energy, water resources, aviation, and transportation. Generally referred to as public-private partnerships, or “P3s,” such project delivery processes are based on methods by which a private developer consortium typically including engineers, constructors, equity investors, lenders, system operators and maintenance firms, accepts significant responsibilities for designing, building, financing, operating and maintaining a major infrastructure project. This is the origin of the term “DBFOM,” which refers to the contractual transaction by which such responsibility and risk are transferred from the public sector to a private sector developer team. What public-private partnerships have in common, regardless of the discrete elements of a specific project, is that there is a strong contractually-driven focus by the developer on the “life-cycle” of a project – meaning that the public and private partners together assure that design and construction is directly associated with long-term facility maintenance, asset management, and customer-oriented system operation. In far too many cases of conventional project delivery, insufficient emphasis is placed on the “life-cycle” of the asset in favor of the more visible front-end construction. This leads to an erosion of nominal state-of-good-repair and ultimately is more costly and problematic to the public owner/operator.

HART has been studying potentially more effective ways of completing the construction of the H RTP – particularly the City Center Guideway and Stations (CCGS) work – while at the same time, in consultation with the City/DTS, incorporating the long-term requirements for cost-effective system operation and maintenance. The CCGS segment is the most complex portion of the civil works within the overall project and is therefore considered a beneficial undertaking for a private partner owing primarily to the substantial interface risks in the design and construction of the guideway, stations, and systems elements.

Ernst and Young Infrastructure Advisors, HART's financial consultant for industry/market sounding, was retained to undertake a focused, independent commercial viability assessment of the utilization of a public-private partnership to complete construction of the CCGS segment and the Pearl Highlands Garage and Transit Center, and to operate/maintain the H RTP on a long-term basis. In summary, the E&Y report concludes that a P3 approach is potentially affordable and beneficial for both HART and the City if undertaken utilizing a partnership structure appropriate to the unique circumstances of the H RTP.

Purpose and Objectives

The principal purpose of this White Paper is to define project delivery structure that meets the following key objectives:

- Provides HART and the City of Honolulu with a “life-cycle” approach that recognizes major infrastructure endeavors are long-term community assets and should be constructed, operated, and maintained accordingly
- Optimizes the management of risks faced in completing construction and operating and maintaining the system
- Assures a process incorporating budgetary discipline and substantially reduces the possibility of cost increases or change orders, other than those related to acts of nature or other unforeseen circumstances
- Confirms adherence to schedule and provides substantial contractual requirements and associated financial penalties to the developer if delays are encountered
- Encourages increased and robust competition from among US-based and international contractors with positive performance records in developing and operating major transit and infrastructure projects, many of whom are unlikely to propose for only a design-build program
- Stipulates procedures for transferring risks and responsibilities of design, construction, finance, operations and maintenance to the developer, while assuring appropriate oversight by HART during construction and the City during operations – thereby eliminating significant requirements for increased staffing by HART and the City during the operational phase
- Promotes incorporation by the developer of technical innovation and best practices by optimizing the developer’s opportunities to connect design and construction with long-term operations and maintenance
- Integrates the mutual goals of HART and the City to build, operate and maintain one of the most significant infrastructure assets undertaken on behalf of the citizens and visitors to Hawaii

Project Funding and Financing

Owing to the passage of Charter Amendment 4, the HRTTP has been effectively divided into two discrete elements:

- All civil and systems construction is under HART, funded by a combination of a surcharge on the General Excise Tax (GEG), an increase in the Transient Accommodations Tax (TAT), and a Federal Transit Administration (FTA) Capital Investment Grant of \$1.55 billion provided through a Full Funding Grant Agreement (FFGA) by the federal government. Both local tax sources currently sunset on December 31, 2030. The GET surcharge is estimated to yield approximately \$4.079 billion between July 1, 2018 and its sunset date in 2030, while the TAT distribution is forecast to produce \$1.102 billion over the same period. The FTA FFGA has been drawn down to date in the amount of \$806.26 million, leaving \$743.74 million remaining for distribution. The grant proceeds are presently on hold by FTA pending final approval of HART's Recovery Plan and revised financial strategy.
- Operation and maintenance is under the auspices of the City, including all O&M related to both systems and non-systems elements. The O&M cost will be funded through an annual City budget appropriation, in the same way that bus and paratransit services have been funded for many years. Ancillary revenues, including proceeds from transit-oriented development (TOD), advertising, etc. would accrue to the City to assist in covering O&M costs, together with all farebox revenues.

To date, financing for capital construction has been obtained by leveraging the capital revenue streams from GEC, TAT and FFGA through sale by the City of short-term commercial paper and general obligation bonds. Bond proceeds to date total approximately \$594 million. The table on the following page shows the summary of cash availability and expenditures to date for design and construction of civil works, systems installation and rolling stock.

The recommended P3 structure employs a different strategy for project finance. Rather than utilizing City-backed bond sales and incurring additional public indebtedness, the design and construction of the remaining civil works – City Center Guideway and Stations (CCGS) and Pearl Highlands Garage and Transit Center (PHGTC) – will be financed by the P3 Partner using its available credit facilities and/or other means of bridging the gap between available revenues from GEC, TAT and FFGA and the cost of construction required to complete the works within the project schedule and timeframe. HART and the City will continue to utilize GO bonding to finance the contracts currently underway outside the P3 scope, including remaining work on the West Side segments, Airport Guideway and Stations, rolling stock acquisition, and systems installation for all segments of the project other than CCGS.

Honolulu Authority for Rapid Transportation				
Summary of Cash Available for P3 and Non-P3				
Subject to Change				
	Unaudited Actuals to June 30, 2018	Remaining Revenues and Expenditures for P3 and Non-P3	Reserve for:	
			Non-P3	P3
Revenues:				
GET	\$ 2,185,597,454	\$ 4,079,000,000	\$ 2,187,000,000	\$ 1,892,000,000
TAT	\$ 8,831,526	\$ 1,102,168,474	\$ 1,102,168,474	\$ -
Fed. Grant	\$ 806,258,735	\$ 743,741,265	\$ 743,741,265	\$ -
City Sub.	\$ -	\$ 214,000,000	\$ 214,000,000	\$ -
Interest & Others	\$ 17,917,527	\$ -	\$ -	\$ -
Total Revenues	\$ 3,018,605,242	\$ 6,138,909,739	\$ 4,246,909,739	\$ 1,892,000,000
Project Expenditures:				
Construction				
CCGS	\$ -	\$ 1,017,600,000	\$ -	\$ 1,017,600,000
Pearl Highlands	\$ -	\$ 314,659,326	\$ -	\$ 314,659,326
Core Systems	\$ 315,716,545	\$ 613,886,055	\$ 441,503,243	\$ 172,382,812
All Others	\$ 1,778,209,773	\$ 1,791,883,864	\$ 1,791,883,864	\$ 0
	\$ 2,093,926,318	\$ 3,738,029,245	\$ 2,233,387,107	\$ 1,504,642,138
Project Management				
HDR	\$ 16,670,256	\$ 97,325,769	\$ 55,477,614	\$ 41,848,155
Stantec	\$ 29,338,943	\$ 122,283,486	\$ 58,004,526	\$ 64,278,960
CH2M	\$ 48,615,398	\$ 69,316,054	\$ 69,316,054	\$ -
Lea & Elloit	\$ 30,830,802	\$ 82,030,465	\$ 82,030,465	\$ -
Lawson	\$ 8,183,605	\$ 19,268,093	\$ 19,268,093	\$ -
All Others	\$ 469,967,087	\$ 133,918,267	\$ 133,918,267	\$ -
	\$ 603,606,091	\$ 524,142,134	\$ 418,015,019	\$ 106,127,115
All Expenditures, Incl. Ineligible Costs Before Pre- Engineering	\$ 591,630,192	\$ 624,328,323	\$ 624,328,323	\$ -
Unallocated Contingencies	\$ -	\$ 81,807,124	\$ 81,807,124	\$ 0
Total Expenditures	\$ 3,289,162,601	\$ 4,968,306,826	\$ 3,357,537,573	\$ 1,610,769,253
Cash Available Before Debt Service	\$ (270,557,359)	\$ 1,170,602,913	\$ 889,372,166	\$ 281,230,747
Debt Service:				
Proceeds	\$ 594,088,965	\$ 4,038,911,035	\$ 2,833,911,035	
Principal Repayments	\$ (150,000,000)	\$ (4,492,000,000)	\$ (3,285,000,000)	
Reserves	\$ (29,687,500)	\$ 29,687,500	\$ -	
Interest Expense	\$ (5,104,921)	\$ (842,895,079)	\$ (485,895,079)	
	\$ 409,296,544	\$ (1,266,296,544)	\$ (936,984,044)	
Cash Available After Debt Service	\$ 138,739,185	\$ (95,693,631)	\$ (47,611,878)	
Cash Reconciliation:				
Beginning Balance	\$ -	\$ 138,739,185	\$ 138,739,185	
Cash Available After Debt Service	\$ 138,739,185	\$ (95,693,631)	\$ (47,611,878)	
Total Cash Available - Unadjusted	\$ 138,739,185	\$ 43,045,554	\$ 91,127,307	

Recommended Public-Private Partnership Structure

There are many variants and “hybrid” arrangements for achieving greater participation of private partners in the delivery of public infrastructure. No two projects utilizing a P3 structure are identical; indeed, every project has unique circumstances relating to funding, financing, legal requirements, political factors, state of completion, competitive issues, etc. The Honolulu Rail Transit Project is no different. Given the fact that the project is currently under construction with numerous contracts already awarded, the situation is quite unique as compared to most “greenfield” projects which are initiated at the outset as public-private partnerships.

Notwithstanding the developmental status of the H RTP, converting the CCGS portion of the project at its current stage to a public-private partnership and incorporating a long-term operations and maintenance component is likely to yield substantial benefits to both HART and the City, assuming the recommended P3 structure incorporates the unique circumstances of the H RTP with respect to the three primary components of the project:

1. **Ongoing and completed capital construction, including guideway, stations and systems:** The majority of West Side guideway segments, from East Kapolei to Aloha Stadium, have been constructed and the Core Systems Contractor is currently installing systems components. The 9 stations along the West Side alignment are currently in construction. Construction of Airport Guideway and Stations (AGS) segment, which starts beyond Aloha Stadium and extends to Middle Street, has commenced and the design-build joint venture is making good progress. As indicated above, capital funding for this work is through the application of the GET surcharge, TAT revenues, and the FTA Capital Investment Grant. HART, through the City, has utilized short-term commercial paper and GO bonding to finance the works, repaid as revenues from the capital sources are received.

It is recommended that this portion of the project – completion of the AGS, finalization of the West Side contracts and related systems installation – continue along its present course and *not* be included in the P3 developer contract. Funding and financing by HART will continue as currently undertaken; the current civil and systems contractors will continue their work accordingly. Under its current contract, the Core Systems Contractor is expected to complete its installation of the systems for the AGS segment in mid-2022 and complete its testing and commissioning for this segment in 2023.

2. **Civil and systems design and construction for the City Center Guideway and Stations (CCGS) and Pearl Highlands facilities:** The design, construction, and systems work for the unbuilt segments of the project will form the core civil construction element of the P3 developer contract. This work, currently estimated in the range of \$1.4 billion, will be funded in the same way as the West Side construction, through GET, TAT, and FFGA. It is anticipated that the CCGS construction will occur between 2020 and 2025, with Revenue Service Date (RSD) required no later than December 2025.

It is recommended that the P3 Partner be required to finance the construction through its own financial arrangements. Given the anticipated annual receipts from the GET and TAT, allocation and disbursement of the FTA grant proceeds over the period between 2020 and the GET/TAT sunset date of December 31, 2030, the developer will receive milestone payments of approximately one-third of its capital construction cost during the 2020-2025 construction period, and the remaining two-thirds between 2025-2030, post-construction. It is assumed that the developer will arrange “bridge financing” through its financial partners to cover its costs of construction between 2020 and 2025, and the remainder of the payments by HART after 2025 will be utilized by the developer to fully retire whatever principal and interest is owing based on the developer’s internal capital structure. HART’s analysis of projected capital source funding indicates that sufficient funds will be available to cover P3 Partner milestone payments during the construction period and estimated principal and interest payments subsequent to substantial completion, which will be paid as capital availability payments (APCs) to the developer.

Since the CCGS work will be completed and the project opened for full revenue service no later than December 31, 2025, there would be a five year “tail” in which HART would be reimbursing about 60% of the P3 Partner’s cost subsequent to completing construction. This represents a substantial hedge against defects and/or non-performance of the civil works and facilities maintenance – a much stronger security, for example, than likely under a traditional design-build delivery approach. If determined to be necessary, additional security for civil work defects could be arranged, either through a surety approach, letter of credit, or parent company guarantee. In effect, HART will maintain a very strong inducement to cure any defects that may arise through retainage of the P3 Partner’s capital availability payments.

The P3 Partner’s scope will include maintenance and “warranty” of its CCGS and Pearl Highlands construction. The P3 Partner would also be provided with all as-builts and engage in appropriate field inspection of the constructed works on the West Side/Airport (built by others) and would be required to include a negotiated level of responsibility for these facilities. Regardless of project delivery method, HART would likely retain certain risks related to the built facilities, including latent defects, force majeure events, etc.

It is further recommended that utilizing appropriate legal/contractual procedures, the Core Systems Contract be amended to effectively have Ansaldo Honolulu JV, HART’s Core Systems Contractor, become a subcontractor to (or a member of) the P3 Partner’s consortium for its work related to the CCGS systems installation. All rolling stock, power distribution, signaling and communications, and other systems components for the entire system will have been paid by HART to Ansaldo by the time construction is completed on the AGS segment. For the CCGS construction, Ansaldo would have its systems installation scope for that segment assumed by the P3 Partner to assure appropriate performance and transfer of the associated “interface risk” from HART to the P3 Partner. Ansaldo will continue performing its current contractual requirements for systems installation and testing; however, the P3 Partner rather than HART would oversee and manage the interfaces between the civil and systems works for the CCGS segment.

3. **Operations and maintenance of the system:** In addition to providing all rolling stock and procuring and installing required systems components, Ansaldo's current Core Systems Contract includes initial operations and maintenance of the system. The operations element of the contract presently includes 22 months of "interim operations" (i.e., the initial westerly 10 miles of the system between East Kapolei and Aloha Stadium), followed by 5 years of full system operation, and an option for an additional 5 years. Since the contract was negotiated prior to a series of project delays, the timing of the operational period no longer corresponds to the current schedule for interim opening and full revenue service. Thus, the P3 program, when adopted as the delivery method, envisions several modifications to the Core Systems Contract, pending concurrence by Ansaldo Honolulu JV.

It is recommended that proposed modification to the Ansaldo contract be undertaken expediently and ideally result in the following arrangement:

- The delivery of all rolling stock and assembly, testing and commissioning of the train sets would remain as in the current contract. Ansaldo will be required to provide all 80 vehicles as specified, as well as spare parts and related equipment, remaining under contract to HART outside the P3 contract.
- Ansaldo would also be required to complete the procurement and installation, testing and certification of all systems components as presently underway for the West Side guideway segments, as well as the AGS segment recently initiated. This element of the Core Systems Contract would also remain as present directly under HART.
- The installation of pre-procured systems components and related systems installation for the CCGS segment would be transferred utilizing appropriate contractual mechanics from HART to the P3 developer, assuring optimal coordination between civil construction and systems installation. This removes a key interface risk and places that risk directly and thus more efficiently with the P3 Partner.
- Based on the current Core Systems Contract and considering the most efficient and expedient solution for HART, the City and Ansaldo, the O&M aspects of the Core Systems Contract will also be transferred utilizing appropriate contractual mechanics to the P3 Partner. Ansaldo will perform its O&M responsibilities under the existing contract as a subcontractor to or member of the P3 developer consortium. Since the 22-month interim period no longer pertains, it is recommended that HART and the City develop a "term sheet" with Ansaldo for presentation to the P3 bidders. This term sheet would incorporate all relevant scope and contractual conditions as currently in place and would provide Ansaldo the opportunity to provide interim operations and maintenance services for the system and an additional period of full system operation once the entire system opens for revenue service in late 2025 as part of the P3 Partner's team.
- The City will provide availability payments to the P3 developer covering operations and maintenance as currently envisioned for the initial 10-year period. This amount would be set in advance owing to the initial negotiation of the term sheet between HART, the

City and Ansaldo, providing certainty to the City regarding its costs over the initial 10-years of system operation and eliminating “surprises.” This approach would enable the City to avoid adding significant additional staff and organizational structure to manage and oversee the initial operations owing the transference of management risk to the P3 Partner and its team – which will include Ansaldo.

- Finally, when the initial O&M term undertaken by Ansaldo under the P3 development agreement concludes, the P3 Partner will retain the option of negotiating with Ansaldo to continue serving as the system operator for all or part of the remainder of the development agreement term. Alternatively, the P3 Partner will have the option of retaining an independent company or utilize its own forces for system operations and maintenance.

To take best advantage of industry bidding and pricing practices, it is recommended that the overall O&M term as be set at 30 years. This would result in a joint HART/City procurement for a single 30-year P3 development agreement, commencing in early 2020 and incorporating both the design-build-finance component for design and construction of the CCGS/Pearl Highlands facilities and the system and facilities maintenance and operations agreement for the entire system extending from 2020 to 2050.

Exhibits 1 and 2 on the following pages illustrate the proposed responsibilities and risk allocation that would be inherent in the P3 project delivery structure for each element of the remaining project scope, including both construction and O&M. Exhibit 1 shows the responsibility and risk distribution under the nominal design-build approach, while Exhibit 2 shows the arrangement as proposed under the recommended DBF/OM P3 structure.

To summarize, the recommended P3 structure will result in the following responsibility/risk allocation:

- Design and construction for West Side and the AGS civil works will continue with existing contracts under direct responsibility and funding by HART
- Design, construction and financing for CCGS and PHGTC civil works will be under the P3 Partner’s scope with oversight and funding by HART
- Maintenance of civil works, including guideway and stations systemwide, will be under the P3 Partner’s scope with oversight and availability funding by the City
- Systems installation for West Side, AGS and the Rail Operations Center will continue under the Ansaldo Core Systems Contract under direct responsibility and funding by HART
- Systems installation and financing for CCGS will be performed by Ansaldo under the P3 Partner’s scope with oversight and funding by HART
- Interim operations and maintenance (2020-2025), including capital asset replacement, will be performed by Ansaldo under the P3 Partner’s scope with oversight and funding by the City

- Full system operations and maintenance (2025-2030), including the capital asset replacement program, will be performed by Ansaldo under the P3 Partner's scope with oversight and availability funding by the City
- Full system operations and maintenance (2030-2050), including the capital asset replacement program, will be performed under the P3 Partner's scope with oversight and availability funding by the City
- Maintenance of non-systems elements of the project will be performed either directly by the City or under the P3 Partner's scope, to be determined during the procurement process with the City

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Honolulu Rail Transit Responsibility / Risk Allocation **Design-Build Delivery**

	2018	2019	2020	2021-2025	2026-2030	2031 - 2050
Manufacture and Delivery of Rolling Stock	HART / Ansaldo					
Civil Construction for West Side Segments	HART					
Systems Installation for West Side Segments	HART / Ansaldo					
Design/Build for Center City Guideway and Stations				HART / DB Contractor 1		
Systems Installation for Center City Guideway and Stations				HART / Ansaldo		
Design/Build for Pearl Highlands Transit Center and Garage				HART / DB Contractor 2		
Interim Operations and Maintenance for Systems and Vehicles				CITY / Ansaldo		
Interim Operations and Maintenance for Non-Systems Elements				CITY		
Full Operations and Maintenance for Systems and Vehicles					CITY / Ansaldo	CITY
Full Operations and Maintenance for Non-Systems Elements					CITY	CITY
Capital Asset Replacement				CITY / (with Ansaldo)		CITY

Honolulu Rail Transit Project Responsibility / Risk Allocation DBF/OM (P3) Delivery

	2018	2019	2020	2021-2025	2026-2030	2031 - 2050
Manufacture and Delivery of Rolling Stock	HART / Ansaldo					
Civil Construction for West Side Segments	HART					
Systems Installation for West Side Segments	HART / Ansaldo					
Design/Build for Center City Guideway and Stations				P3 Partner		
Systems Installation for Center City Guideway and Stations				P3 Partner / Ansaldo		
Design/Build for Pearl Highlands Transit Center and Garage				P3 Partner		
Interim Operations and Maintenance for Systems and Vehicles				P3 Partner / Ansaldo		
Interim Operations and Maintenance for Non-Systems Elements				CITY / P3 Partner		
Full Operations and Maintenance for Systems and Vehicles					P3 Partner / Ansaldo	P3 Partner
Full Operations and Maintenance for Non-Systems Elements					CITY / P3 Partner	
Capital Asset Replacement				P3 Partner		

Comparative Assessment: Design-Build Compared to Design-Build-Finance/Operate-Maintain

Risk Assessment: Risk Workshop and Risk Modeling Protocol

During the week of June 19-21, 2018, HART and consultant staff met to conduct a risk assessment workshop. Prior to this workshop, schedule and cost base estimates, as well as background materials, were distributed to the workshop participants, including representatives from HART, City and County of Honolulu, and financial and project delivery experts. The purpose of the workshop was to define the risks that differed between the two proposed delivery methods: Design-Build (DB) and Design-Build-Finance/Operate-Maintain (DBF/OM (P3)) and to assess which delivery approach would provide greater cost and schedule certainty.

Workshop attendees were introduced to the specific project elements, the delivery concepts under consideration, and to the purpose and format of the risk workshop:

- Define and review or validate cost and schedule base estimates for Design-Build (DB) delivery
- Prepare the base cost and schedule for P3 delivery
- Replace or reduce the traditional project “contingency”
- Identify and quantify key project risks with P3 delivery that are different than DB delivery
- Perform a Monte Carlo simulation analysis to model the collective impact of base and risk issues using either DB or P3 project delivery mechanisms. (Monte Carlo analysis involves determining the impact of the identified risks by running simulations to identify the range of possible outcomes for a number of scenarios. A random sampling is performed by using uncertain risk variable inputs to generate the range of outcomes with a confidence measure for each outcome)
- Produce an estimate of a reasonable range and distribution of project cost and schedule for DB and P3 delivery
- Promote proactive risk management by project teams
- Document assumptions and constraints used in developing the estimated project cost and schedule range
- Discuss how to mitigate risks, including how they might be allocated in the contracts

Risk assessments have been ongoing on HRTTP project since inception. They are updated regularly and used as a project management tool. The focus of this risk workshop was specifically on how risks may differ depending on the delivery method. The types of risks assessed included:

- Design / Construction
- Core Systems
- Procurement
- Fare Systems
- Market / Delivery Method
- Management Capability and Capacity

During the workshop, participants worked through the existing risk register and identified several new risks, recognizing that not all risks are inherently “bad” – some risks are actually opportunities for cost and schedule savings. Most risks were ruled to be the same regardless of delivery method (for example, geotechnical risks). Experts from different disciplines joined the risk workshop at different times to help identify, describe, and categorize specific risks. They worked to assign a probability of occurrence, and estimated ranges for cost and/or schedule impacts. This information was then input into the risk model to obtain a risk-adjusted cost and schedule.

Exhibit 3 focuses on the key risk differentiators for capital costs and schedule between DB and DBF/OM. Many risks were identical between the two delivery methods and are not depicted in the Exhibit. Key risk observations are shown in Exhibit 4. These are concerns that were initially noted as risks but were not assigned probabilities for cost and schedule impact.

O&M costs were sourced from HART’s Financial Plan, the Core Systems contract with Ansaldo, and updated costs estimates of O&M for non-systems elements prepared by HART. The qualitative risks associated with O&M were not modeled in the formal risk analysis but are discussed in subsequent sections, divided into systems and non-systems elements. The DBF/OM (P3) delivery includes modifying Ansaldo’s current contract.

The following section addresses the key risks identified as differing between DB and DBF/OM, and thus which could impact cost, schedule, or both.

Exhibit 3

Key Risk Differentiators

Comparison of Risk Differentiators for Design-Build (DB) and Design-Build-Finance-Operate-Maintain, (DBF/OM or P3)			Key Risk Differentiators Design-Build Procurement			Design-Build-Finance-Operate-Maintain (DBF/OM or P3)		
Project Element	Threat / Opportunity Events	Description	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact
Procurement	Risk of joint procurement with City resulting in schedule delay to P3 procurement	The base schedule for P3 incorporates the risk of delay owing to the requirement for concurrence between HART and the City regarding key decisions that affect procurement of both construction and operations of the project. This risk considers additional delay beyond the base schedule. <i>Risk ID: P3 CTR 10.01</i>	0%	NA	NA	25%	1-2 Month Delay	NA
Procurement	Risk of delay in notice-to-proceed due to potential bid protest	With DB and P3 delivery there is a risk of bid protest to unsuccessful bidder(s), but the likelihood of cost and schedule impacts is greater with a P3 delivery because there is much more at stake for the proposing firms. This risk is based on previous experience. There is consideration of a schedule impact for P3. There is no cost impact assumed other than a monetized schedule delay. <i>Risk ID: DB CTR 10.02, and P3 CTR 10.02</i>	12% total (Allocated)	1 month—5% to 14 months—2%	NA	23% total (Allocated)	1 month—10% to 14 months—3%	NA

Exhibit 3

Key Risk Differentiators

Comparison of Risk Differentiators for Design-Build (DB) and Design-Build-Finance-Operate-Maintain, (DBF/OM or P3)			Key Risk Differentiators Design-Build Procurement			Design-Build-Finance-Operate-Maintain (DBF/OM or P3)		
Project Element	Threat / Opportunity Events	Description	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact
ROW	Risk of late delivery of ROW necessary for on time completion of CCGS	Risk of not having necessary ROW acquisitions in time for sequencing of CCGS construction and systems installation. During the CCGS procurement, it will be necessary for a last addendum to the RFP, prior to contract-signing, to report on full resolution of remaining ROW acquisition necessary for the P3 or DB to rely on for CCGS project construction. The costs recorded represent a financing charge of \$1.062M per month of delay. This cost represents the additional financing costs a P3 developer would experience above and beyond a design-build procured project. <i>Risk ID: DB ROW 10.01, and P3 ROW 10.01</i>	25%	1-6 Month Delay	NA	25%	1-6 Month Delay	\$1.06 -\$6.37 M Cost Increase
CCGS Design & Construction	Opportunity for P3 to present a cost and schedule reduction for construction of CCGS	Opportunity risk that P3 delivery for CCGS would offer innovation and an economy in design and construction costs or schedule compared to DB delivery. This savings would be realized in lower bid prices due to increased competition for a much larger contract. Consider a 95% probability of a 3% to 5% capital cost savings, and a 4 to 6-month schedule reduction for a P3 compared to a DB. <i>Risk ID: P3 CNS 10.01</i>	0%	NA	NA	95%	4-6 Month Savings	\$30-50 M Cost Savings

Exhibit 3

Key Risk Differentiators

Comparison of Risk Differentiators for Design-Build (DB) and Design-Build-Finance-Operate-Maintain, (DBF/OM or P3)			Key Risk Differentiators Design-Build Procurement			Design-Build-Finance-Operate-Maintain (DBF/OM or P3)		
Project Element	Threat / Opportunity Events	Description	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact
CCGS Design & Construction	Opportunity for DB and P3 to present a schedule reduction during commissioning and testing of the overall rail system	Opportunity for DB and P3 to present a schedule reduction during commissioning and testing of the overall rail system. This would be accomplished by overlapping the end of CCGS construction with the start of the commissioning and testing of the overall rail system. For DB assume a 50% probability of a 0 to 1-month schedule reduction. For P3 assume a 95% probability of a 2 to 3-month schedule reduction. <i>Risk ID: DB CNS 10.02, and P3 CNS 10.02</i>	50%	0-1 Month Savings	NA	95%	2-3 Month Savings	NA
PHGTC Design & Construction	Opportunity for P3 to present a cost and schedule reduction for construction of PHGTC	Opportunity risk that P3 delivery for PHGTC would offer innovation and an economy in design and construction costs or schedule compared to DB delivery. Consider a 75% probability of 2.5% to 5% capital cost savings, and no schedule reduction, for P3 compared to DB. <i>Risk ID: P3 CNS 10.03</i>	0%	NA	NA	75%	NA	\$7.5-15.5M Cost Savings

Exhibit 3

Key Risk Differentiators

Comparison of Risk Differentiators for Design-Build (DB) and Design-Build-Finance-Operate-Maintain, (DBF/OM or P3)			Key Risk Differentiators Design-Build Procurement			Design-Build-Finance-Operate-Maintain (DBF/OM or P3)		
Project Element	Threat / Opportunity Events	Description	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact	Probability of Occurring	Potential Schedule Impact	Potential Cost Impact
Planning	Application & Adherence of SOI Standards is evolving	Risk that application of SOI standards as stipulated in the Program Agreement (PA) could affect the CCGS project schedule. The parties in the PA are believed to have differing requirements for at least 5 CCGS stations adjacent to historic properties. The PA is between the Navy, SHIFTE, FTA, others, resulting from Section 106. Mitigation: Develop better working process between HART and the PA representatives. Schedule delays could result if the anticipated requirements affecting the DB's or P3's design are not properly reflected in the procurement documents. <i>Note: This is a non-critical patch schedule risk for both DB and P3, meaning a schedule impact for this item can be dealt with within the overall schedule, not resulting in an overall project delay.</i> <i>Risk ID: DB DES 10.01, and P3 DES 10.01</i>	50%	3-12 Month Delay (Non-Critical Path)	\$3-10 M Cost Increase	50%	3-12 Month Delay (Non-Critical Path)	\$3-10 M Cost Increase
Administrative Oversight	Owner's Cost of Design & Construction Oversight	Opportunity to lower costs for design & construction oversight under a P3 as some oversight activity is taken on by the P3 Partner. <i>Risk ID: P3 CNS 10.04</i>	0%	NA	NA	80%	NA	\$5-10M Cost Savings

Key Risk Observations

Project Element	Threat / Opportunity Events	Description
Risk Observations: The following concerns were initially noted as Risks, but were not assigned probabilities for cost and schedule impact. They are noted as Risk Observations for the reasons noted.		
Management	Risk of obtaining City Approval (MOU) for P3 Delivery and HART Board Approval	The risk of delayed White Paper concurrence from the City of a P3 including a commitment for 25 to 30 years of future O&M in P3- joint contract. This concurrence is needed in time for the July 19, 2018 HART Board Meeting or at the presumed latest by mid-August 2018 in order to issue the RFP. If no agreement reached, then it is a No-Go for P3, and HART will need to default to the DB alternative. (Mitigation: Achieve an informed decision by answering all relevant City and HART Board questions.)
Procurement	Risk of delay of procurement due to "Data Needs" to Proposers	Likelihood of delay during the RFP process with a P3 owing to missing or incomplete technical documents; offerors may request more time to review documents. (Mitigation: The base schedules for DB and P3 include sufficient time to cover this risk, including 4 additional months for the P3 procurement.)
Market	Marketplace opportunity risk (to increase the number of qualified competing contractors) for CCGS and PHGTC	Opportunity to attract a greater number of competing firms for the project is greater with a P3 delivery because of the greater dollar value of the work with future O&M along with capital construction. This is not modeled as a specific opportunity risk because the schedule and cost reduction potentials are already considered in the other opportunity risks herein for cost and schedule savings to CCGS and PHGTC through a P3 delivery.

Source: HART Risk Assessment Workshop, June 2018

Cost and Schedule Risk Analysis Results

The results of the analysis along with a profile of the top risks affecting both cost and schedule is provided in this section. The risk-adjusted total cost results are presented first, followed by the key cost risks, and a stacked bar graph that illustrates the comparison between the two delivery methods. The cost results are then followed by the analysis of the risk-adjusted schedule results in addition to the key risk factors for project schedule.

Capital costs include the design and construction of Pearl Highlands Garage and Transit Center, the design and construction of the City Center Guideway and Stations Segment, the systems installation of the City Center Guideway Segment, and construction management oversight for both capital projects.

O&M costs include systems and vehicles as well as non-systems elements over three sets of time periods: Interim O&M for the systems and vehicles (2020-2025); interim O&M for the non-systems elements (2020-2025); full O&M for the systems and vehicles (2026-2030); full O&M for the non-systems elements (2026-2030); full O&M for the systems and vehicles (2031-2050); and full O&M for the non-systems elements (2031-2050). These are separated in this manner due to the existing Ansaldo contract.

The risk adjusted schedule for both capital and O&M components is presented next and includes probability distributions of risk-adjusted schedule for the DB and DBF/OM (P3) delivery methods as well as the top risks (opportunities). A summary of the overall results is included at the conclusion of this section.

Cost Comparison: DB versus DBF/OM (P3)

While the differences between DB and DBF/OM (P3) analyzed in the risk workshop ranged over a wide variety of topics, primary cost differences were related to procurement, design and construction, O&M, and financing. The capital costs are presented and discussed first. Following that, the probability distributions of each risk-adjusted delivery method are shown as well as the primary risks (opportunities).

Capital Costs

Base capital cost estimates (in 2018 dollars) were developed for the DB and DBF/OM (P3) and used as a starting point to inform the risk analysis. Two different base costs were developed: \$1,610.07 million for the DB and \$1,640.22 million for the DBF/OM. The base cost of the full DBF/OM is higher than the base cost of the DB because it accounts for an estimated four month delay due to the longer procurement schedule for DBF/OM and the cost of legal and financial advisory services and transaction management and coordination. The base cost estimates for each delivery method were developed in consultation with HART financial and technical staff and reviewed during the opening day of the risk workshop to ensure that aspects of each delivery scenario were correctly included.

The base cost estimates were then subjected to extensive risk review for purposes of deriving risk-adjusted capital costs for the two delivery methods as shown in Exhibits 5-7. As shown in Exhibit 5, there are slight differences in all cost elements which add up to the DBF/OM (P3) providing a \$46.38 million cost savings. Exhibit 6 illustrates the total risk-adjusted capital costs for each delivery method, broken out by component. Exhibit 7 focuses on the funds remaining within the affordability cap of

funding reserved for completion of the City Center Guideway Segment (CCGS) and the Pearl Highlands Garage and Transit Center and related program management and systems costs. Because the DBF/OM (P3) has lower capital costs, there are more funds remaining from which to cover the debt service costs and other components that will be included in the P3 Partner’s cost proposal.

Exhibits 8 and 9 depict the results of the total cost risk analysis in the form of a probability distribution, or “S-Curve” graph. The S-curve shows the relationship between cost and the probability of remaining within that cost. Each graph indicates the best opinion of the cost ranges by the workshop participants at the time of the analysis. The solid black vertical line represents the base costs to complete the project, while the highlighted horizontal line represents the risk-adjusted cost to complete in YOE dollars, or \$1,626.98 million in the DB scenario, and \$1,580.60 million in the DBF/PM (P3) scenario.

The green curve represents the cumulative probability distribution for the post-response costs – costs of the risks after including all of the developed response strategies. With these risk response strategies included, the costs to complete now have an 80 percent chance of being less than or equal to the costs shown below.

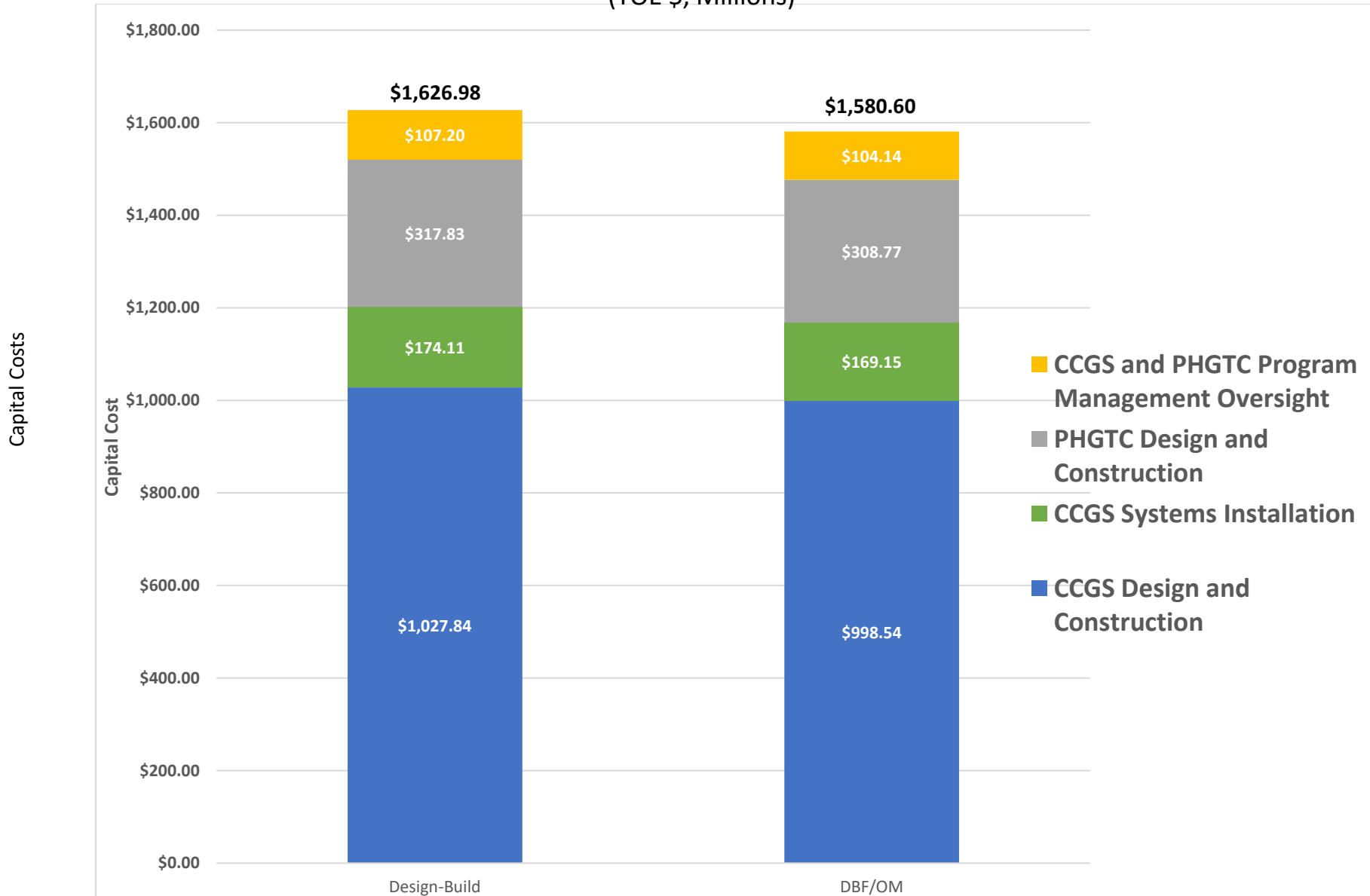
<u>Risk-adjusted Cost Estimates (YOE dollars)</u>	
DB	\$1,626.98 million
DBF/OM (P3)	\$1,580.60 million

Exhibits 10 and 11 are diagrams showing the top cost risks that affect the delivery method. This “tornado” chart shows the expected value for each risk. Bars in the negative cost region (to the left of \$0) represent opportunity risks while bars in the positive cost region (to the right of \$0) represent threat risks. There are risks and modest opportunities for the DB chart, and risks with some offsetting opportunities for the DBF/OM (P3) chart, as ranked by expected value. It should be noted that the scale of the figures differ in order to more clearly reflect the range of values associated with the two delivery options.

The risks in the tornado chart are ranked in descending order by the magnitude of the expected value, with the largest risks at the top of the diagram. Risk names are listed along the vertical axis with the expected impact (in million \$) shown along the horizontal axis. The overall impact of the risk may be comprised of three components: Impact caused by the risk occurring (risk cost impact – dark red and dark green bars), impact due to escalation (medium red and medium green), and extended overhead costs (light red and light green) caused by project delay.

The risk cost impact is measured as the probability of the risk times the mean cost impact developed during the Workshop, as risk cost ranges recorded within the risk register. Escalation impacts are the additional costs borne by a project and attributed to a schedule delay risk. Such costs might stem from the higher costs of construction required as expenditures are pushed further into the future. Extended Overhead Costs are increases in project management expenses incurred as a result of a schedule delay risk that extends the duration of a project and requires additional project oversight.

RISK-ADJUSTED CAPITAL COST OF DB AND DBF/OM (P3) IMPLEMENTATION (YOE \$, Millions)



Source: HART Risk Assessment Workshop, June 2018

Exhibit 6

RISK-ADJUSTED CAPITAL COST OF DB AND DBF/OM (P3) IMPLEMENTATION

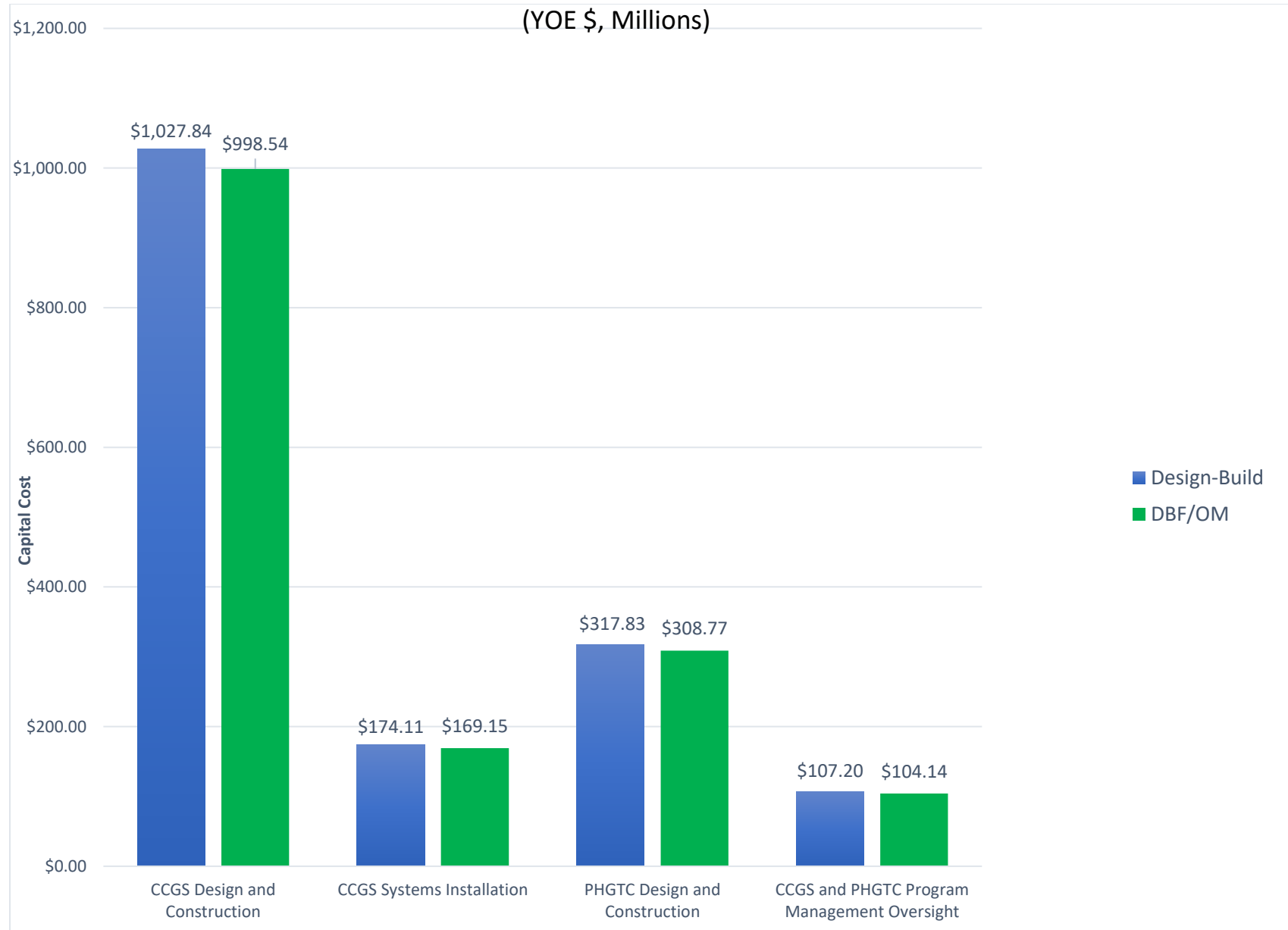
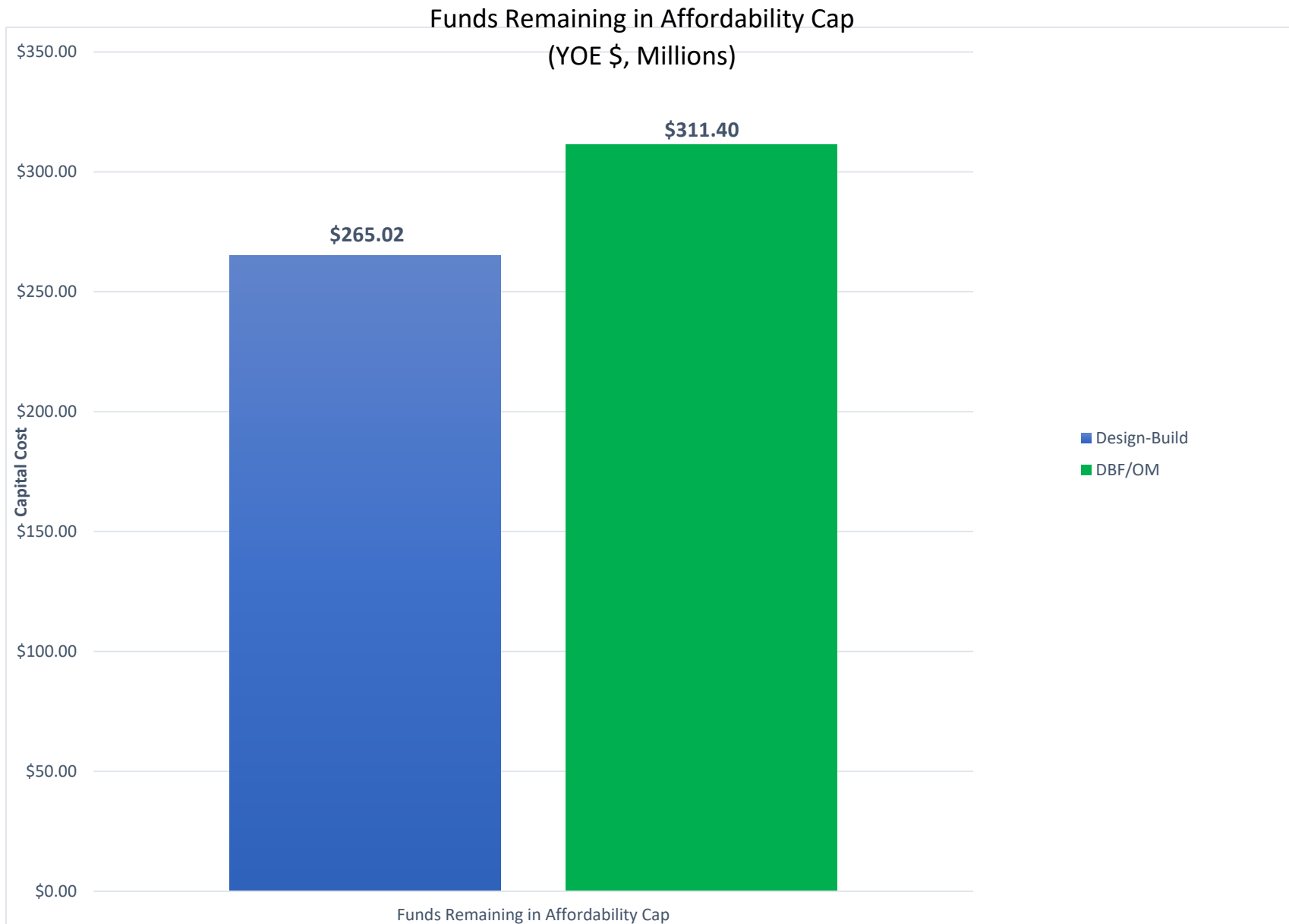


Exhibit 7

Risk-Adjusted Capital Cost of DB and DBF/OM (P3) Implementation:



Source: HART Risk Assessment Workshop, June 2018

Exhibit 8

Design-Build Cost S-Curve

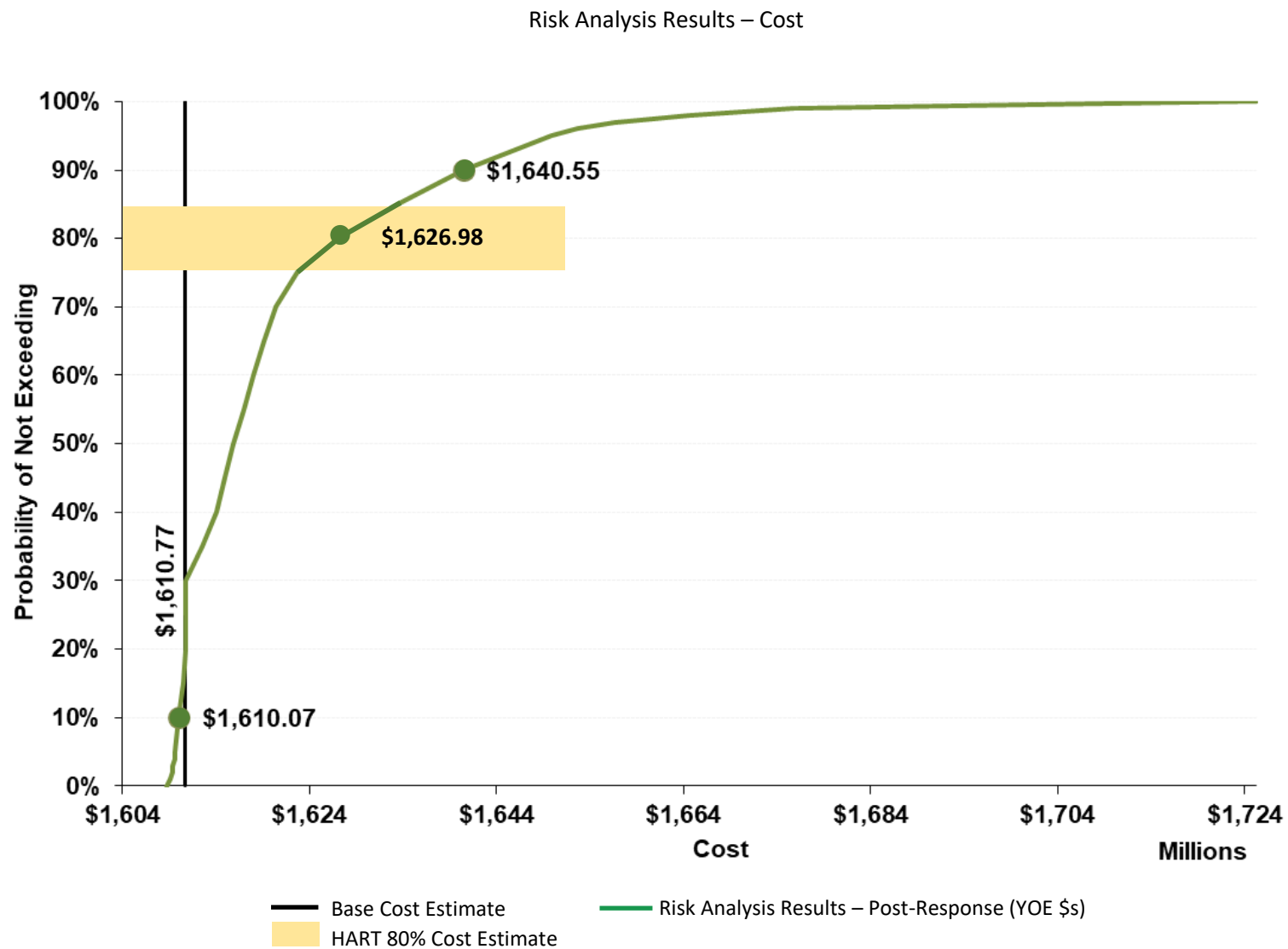
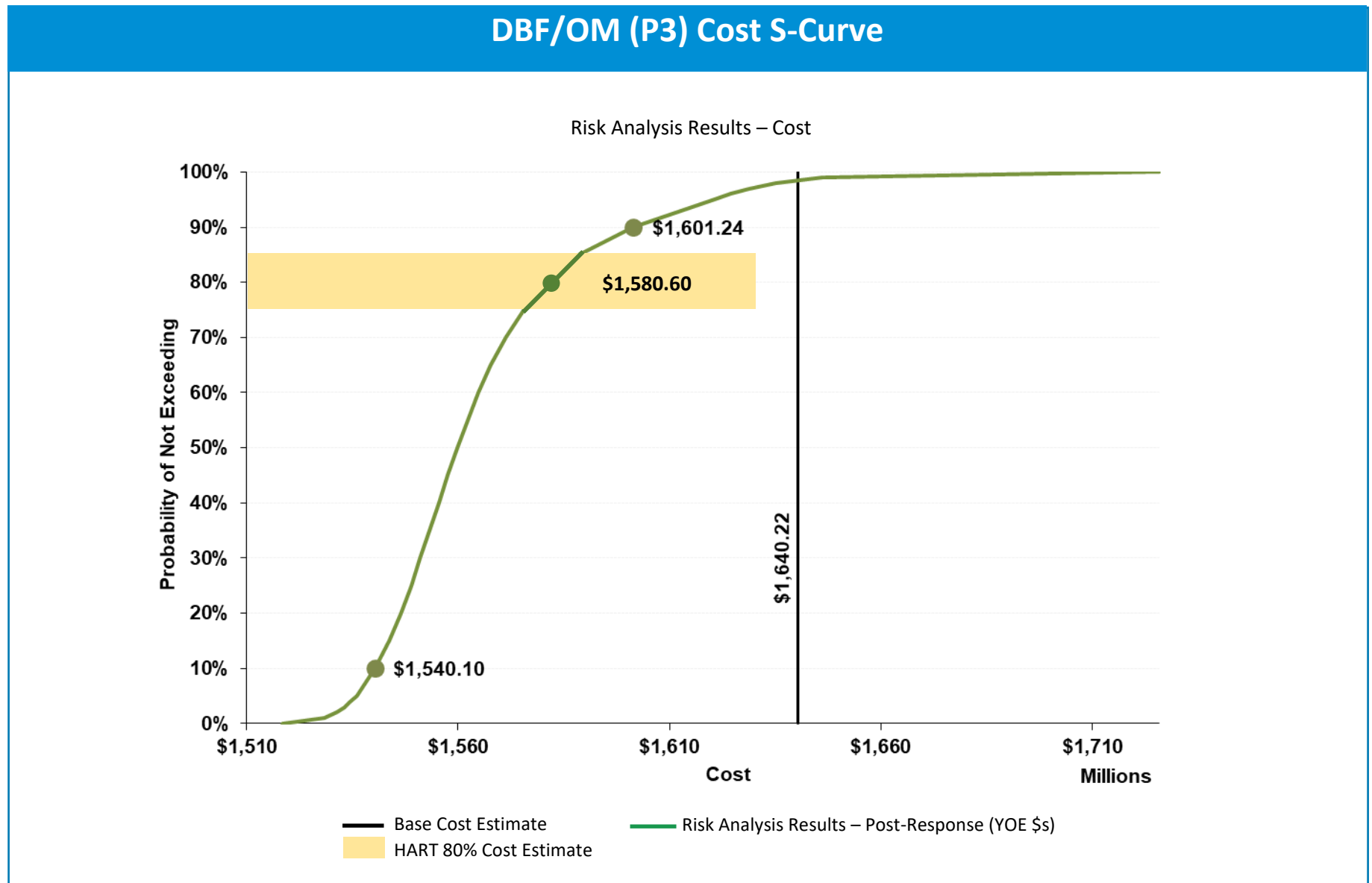


Exhibit 9



Source: HART Risk Assessment Workshop, June 2018

Exhibit 10

Top Risks Impacting Cost Tornado Chart – DB (YOE \$, Millions)

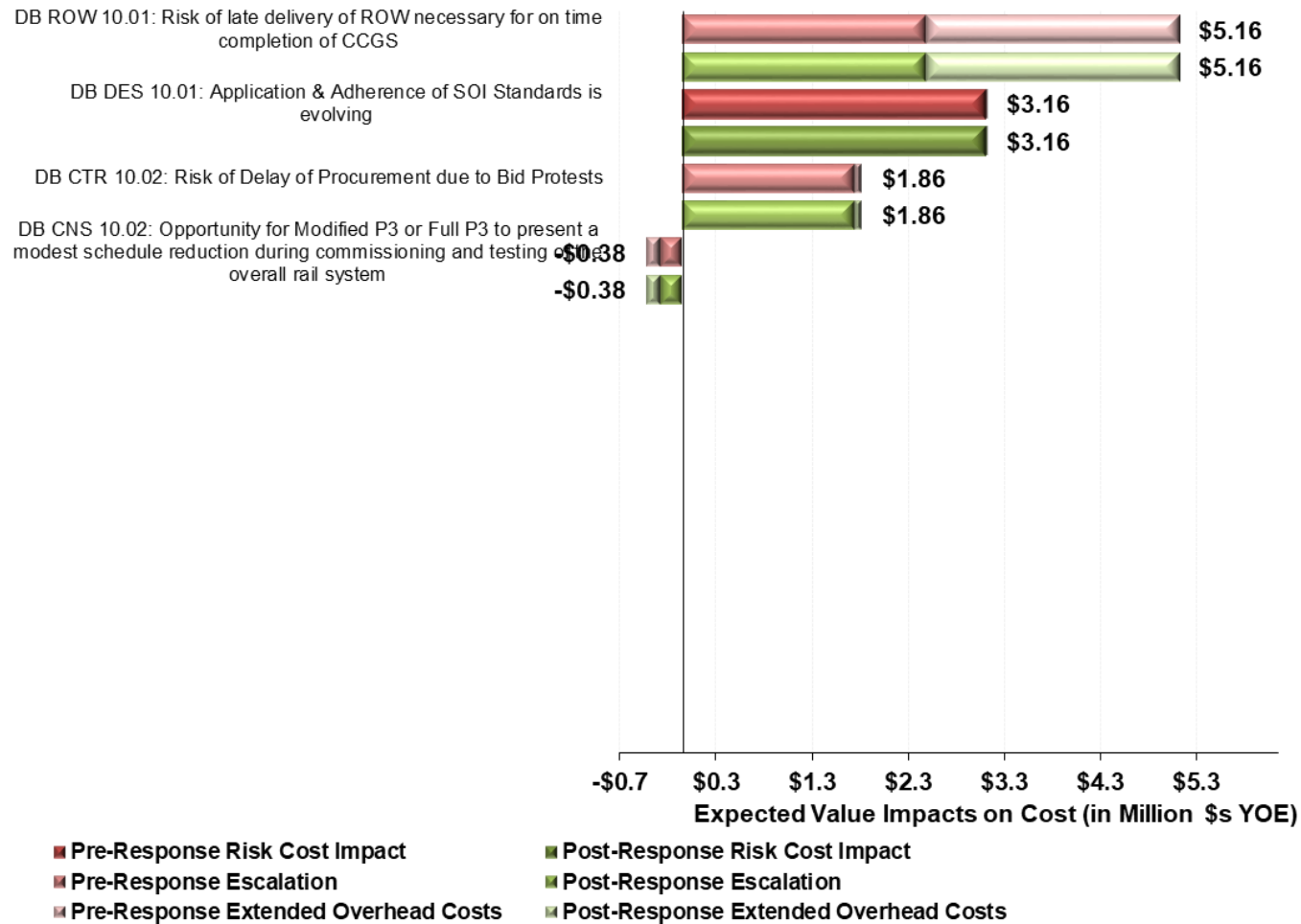
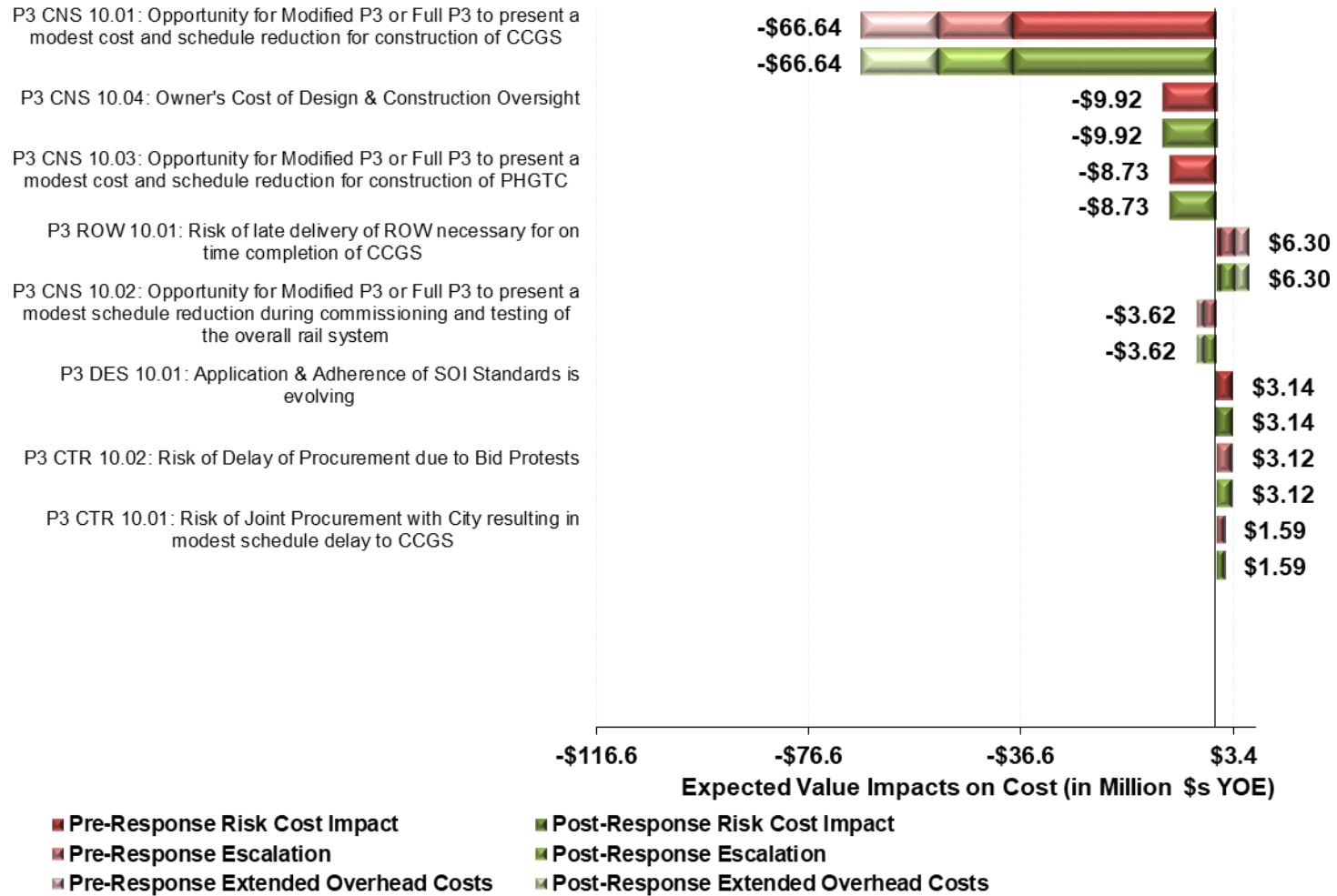


Exhibit 11

Top Risks Impacting Cost Tornado Chart – DBF/OM (YOE \$, Millions)



Operations and Maintenance Costs

While not part of the risk assessment modeling process, the evaluation included consideration of the comparative costs associated with Operations and Maintenance (O&M) of the HRTTP under DB and DBF/OM. O&M costs consist of two major components, each of which are discussed below:

- O&M Costs for Systems and Vehicles
- O&M Costs for Non-Systems Elements

O&M for Systems and Vehicles

Ansaldo's current Core Systems Contract includes responsibility for initial operations and maintenance of the system, in addition to providing all rolling stock and procuring and installing required systems components. The operations element of the contract presently includes 22 months of "interim operations" (i.e., the initial westerly 10 miles of the system between East Kapolei and Aloha Stadium), followed by 5 years of full system operation, and an option for an additional 5 years. Since the contract was negotiated prior to a series of project delays, the timing of the operational period no longer corresponds appropriately to the current schedule for Interim opening and Full Revenue Service. To reflect the actual schedule for operations, Ansaldo's contract would need to be modified to provide for O&M of Interim Service between East Kapolei and Aloha Stadium and for O&M of initial Full Revenue Service between East Kapolei and Ala Moana.

Under both the DB and DBF/OM (P3) alternatives considered, Ansaldo is assumed to be responsible for systems-related O&M over the 2020 – 2030 period. Under the DB alternative, Ansaldo would continue to perform this function under contract, with the potential for Ansaldo to perform this work under the P3 Partnership in the DBF/OM alternative. The annual costs for Ansaldo to perform these functions are derived from the costs included in the Core Systems contract, escalated to YOE dollars. Over the 2020 – 2030 period, these costs total \$838.68 million in escalated (YOE) dollars, or \$563.11 million in 2018 constant dollars. Consistent with the Core Systems contract for the first 10 years of Full Revenue Service, these costs include an annual allowance for Capital Asset Replacement, which averages \$10.7 million (in 2018 dollars).

For purpose of this comparative analysis, in light of the fact that discussion and negotiation of contractual changes with Ansaldo are in the early stages, the conservative assumption was made that Ansaldo would continue under contract through 2030 under both the DB and DBF/OM alternatives, with no differential in cost assumed between the two alternatives. In this way, the cost comparison for systems-related O&M was not affected by any assumption of cost savings associated with differences attributable to Ansaldo's current contract.

Post-2030, the DB and DBF/OM alternatives are assumed to differ. The assumption in the DB alternative is that the City would retain either Ansaldo or another O&M vendor for continued systems-related O&M. Under the DBF/OM alternative, the P3 Partnership would continue to oversee O&M and could either continue to retain Ansaldo as a member of the P3 team or select another vendor.

For the 2030 – 2050 period, under the DB alternative the City is assumed to secure systems-related O&M under contract through either continuation with Ansaldo or with another vendor, requiring a transition period for the new vendor. Under the DBF/OM alternative, systems-related O&M would be part of the P3 Partnership, with a long-term contract negotiated at the outset of the concession period that would provide continuity and opportunity for a cost savings of at least 10 percent. Thus, the opportunity for cost-savings under a DBF/OM is directly attributable to the long-term contractual relationship between the HART and the City and the P3 Partnership. Systems-related O&M costs over the 2030 – 2050 period are projected to total \$3,096.73 million in YOE dollars (\$1,270.82 million in 2018 dollars) for the DB alternative and \$2,787.06 million in YOE dollars (\$1,143.74 million in 2018 dollars) for the DBF/OM alternative. This results in a potential cost-savings of \$309.67 million under the DBF/OM alternative.

O&M for Non-Systems Elements

Under both the DB and the DBF/OM alternatives considered, non-systems O&M would be the responsibility of the City and performed either by agency staff or under contract. These functions include the following:

- Power
- Guideway maintenance (non-systems related)
- Security patrols
- Fare collection and enforcement
- Station maintenance
- Water
- PSG

The City is currently working with HART to better define the non-systems maintenance responsibilities for the HRTTP and associated costs. For purpose of this comparative analysis, over the full 2020 – 2050 evaluation period, the DB and the DBF/OM alternatives were assumed to be identical with respect to these functions and costs. Based on updated assessment conducted by HART of costs estimated for purpose of the HRTTP financial plan and the Full Funding Grant Agreement with FTA, the annual cost for these functions was estimated to be \$44.7 million (in 2018 \$). Such costs were assumed to increase 3 percent per year with inflation.

Over the 2020 – 2050 period, the City's O&M costs for non-systems elements were projected to total \$2,171.32 million in YOE dollars inclusive of inflation. In 2018 dollars without inflation, this is equivalent to \$1,265.98 billion for both DB and DBF/OM alternatives.

Comparison of Total O&M Costs for DB and DBF/OM Delivery

Exhibit 12 and the two tables below summarize the total systems and non-systems O&M costs of the DB and DBF/OM alternatives over the 2020 – 2050 period. Total O&M costs for the DB alternative total \$6,106.75 million in YOE \$, or \$3,099.88 million in 2018 \$. In comparison, total O&M costs for the DBF/OM alternative total \$5,797.08 million in YOE \$, or \$2,972.83 million in 2018 \$.

Exhibit 13 further compares total O&M costs of the DB and DBF/OM alternatives, showing costs related to systems and vehicles and costs related to non-systems elements by time period. As indicated, the

cost savings associated with DBF/OM are attributable to long-term systems-related O&M costs that would be part of the P3 scope over the 2030-2050 period.

Depending upon pending contract negotiations with Ansaldo, such cost savings under the DBF/OM delivery scenario could commence in 2020 at the initiation of the P3 concession term, but are shown as equivalent between DB and DBF/OM for this analysis.

TOTAL O&M COSTS, 2020 – 2050 (YOE \$, MILLIONS)				
O&M Costs, by Element	2020-2025	2026-2030	2031-2050	Total 2020-2050
DB				
O&M for Systems and Vehicles	\$272.27	\$566.41	\$3,096.73	\$3,935.41
O&M for Non-Systems Elements (City)	\$167.80	\$291.75	\$1,711.79	\$2,171.34
TOTAL, DB	\$440.07	\$858.16	\$4,808.52	\$6,106.75
DBF/OM (P3)				
O&M for Systems and Vehicles	\$272.27	\$566.41	\$2,787.06	\$3,625.74
O&M for Non-Systems Elements (City)	\$167.80	\$291.75	\$1,711.79	\$2,171.34
TOTAL, DBF/OM (P3)	\$440.07	\$858.16	\$4,498.85	\$5,797.08
Net Savings from DBF/OM (P3)	\$0.00	\$0.00	\$309.67	\$309.67

TOTAL O&M COSTS, 2020 – 2050 (2018 \$, MILLIONS)				
O&M Costs, by Element	2020-2025	2026-2030	2031-2050	Total 2020-2050
DB				
O&M for Systems and Vehicles	\$224.02	\$339.06	\$1,270.82	\$1,833.90
O&M for Non-Systems Elements (City)	\$148.94	\$223.41	\$893.63	\$1,265.98
TOTAL, DB	\$372.96	\$562.47	\$2,164.45	\$3,099.88
DBF/OM (P3)				
O&M for Systems and Vehicles	\$224.05	\$339.06	\$1,143.74	\$1,706.85
O&M for Non-Systems Elements (City)	\$148.94	\$223.41	\$893.63	\$1,265.98
TOTAL, DBF/OM (P3)	\$372.96	\$562.47	\$2,037.37	\$2,972.83
Net Savings from DBF/OM (P3)	\$0.00	\$0.00	\$127.08	\$127.08

O&M Costs of DB and DBF/OM (P3) Implementation (YOE \$, Millions)

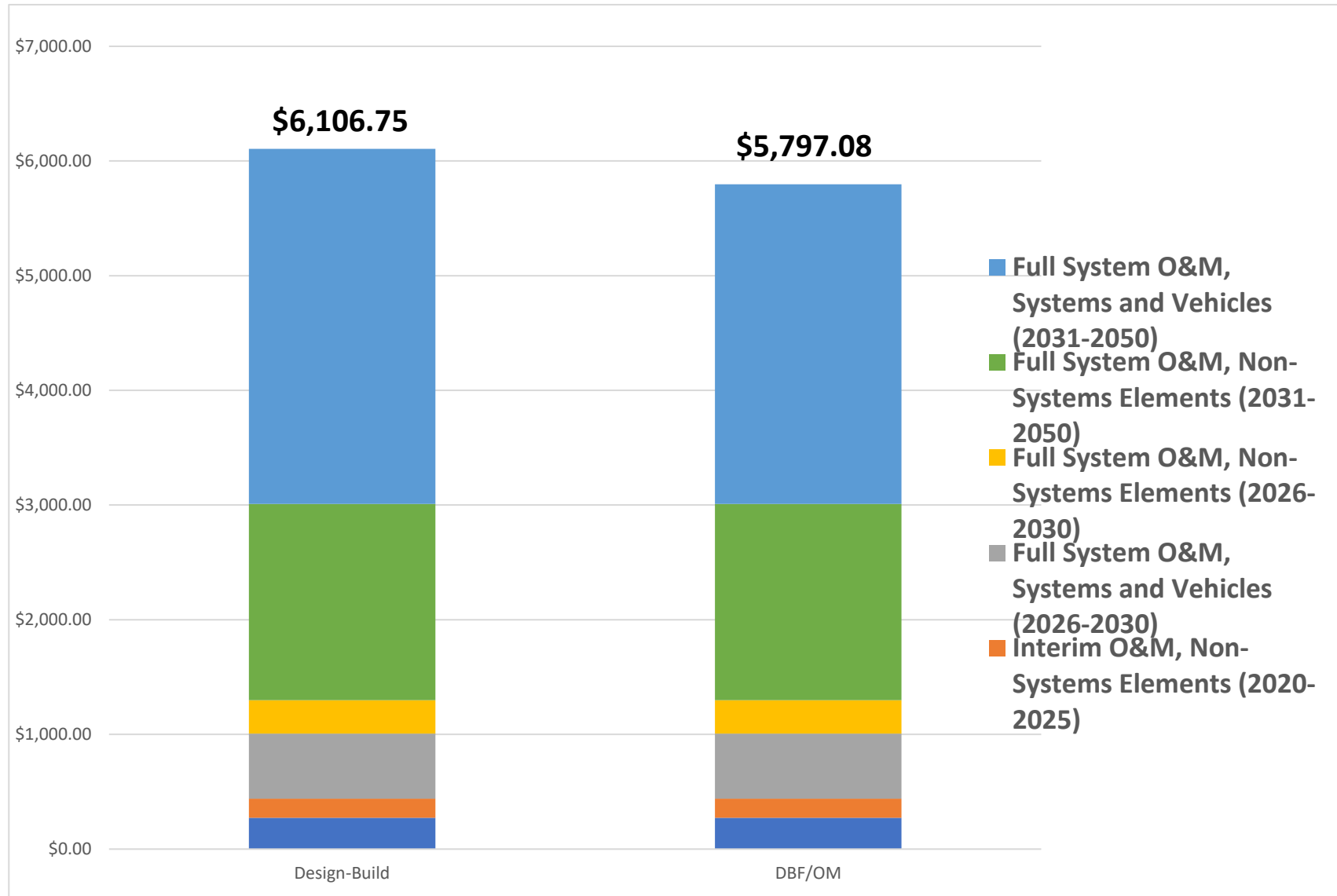
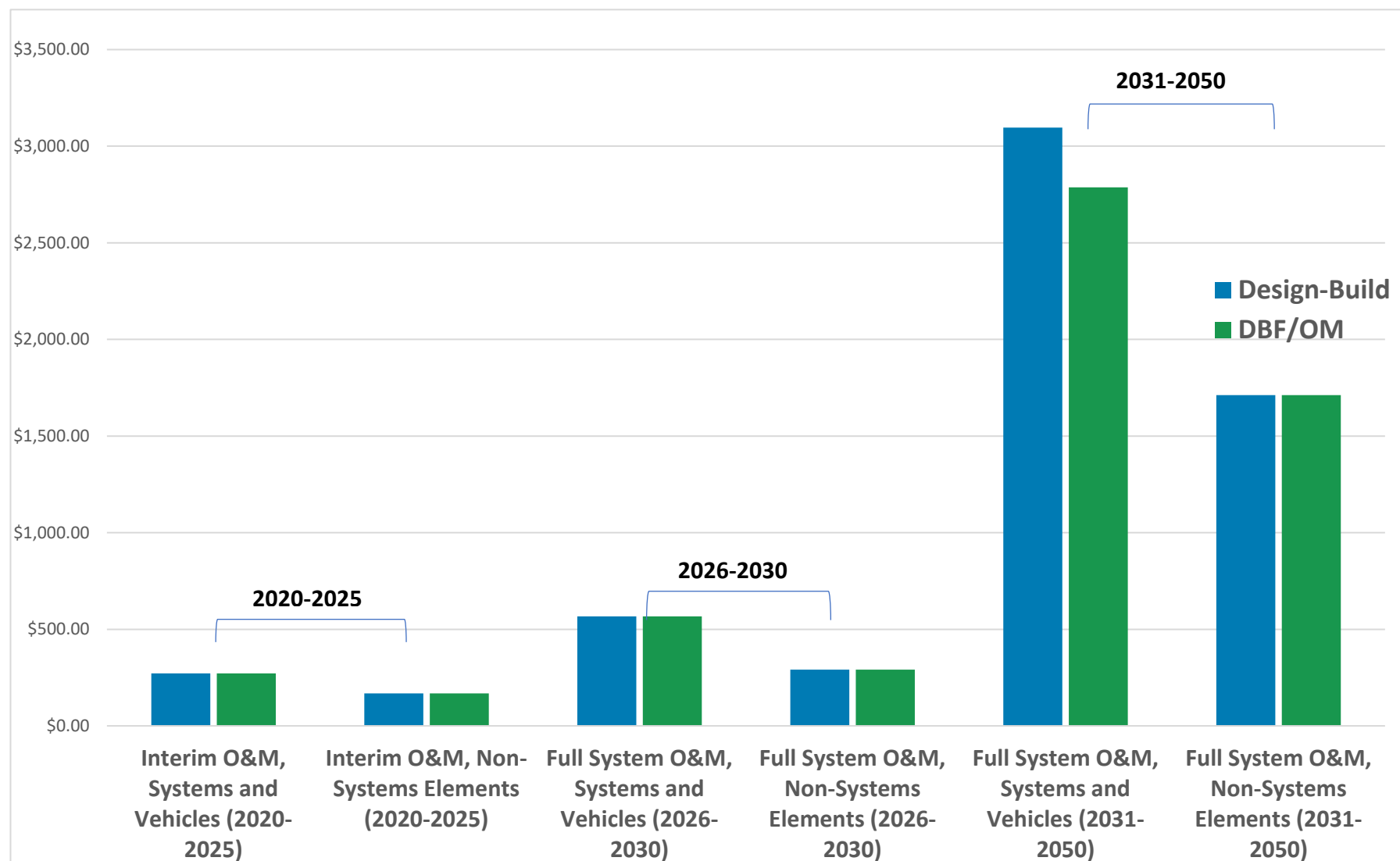


Exhibit 13

O&M Costs of DB and DBF/OM (P3) Implementation (YOE \$, Millions)



Note: Includes annual allowance for Capital Asset Replacement

Schedule Comparison: DB versus DBF/OM (P3)

The primary schedule differences identified in the risk workshop were related to procurement and design/construction/systems testing. The probability distributions of each risk-adjusted delivery method are discussed as well as the top risks (opportunities). Capital construction and procurement issues are addressed first, followed by O&M schedule comparisons.

Capital / Procurement Schedule Risks

The risk-adjusted probabilistic distribution regarding project completion and Revenue Service Date is shown in Exhibits 14 and 15. The committed RSD is no later than December 2025. If the project is delivered utilizing design-build, there is a 65-percent probability of completion in late December 2025, as shown in the green S-curve in Exhibit 14. This includes the risks identified during the risk workshop as potentially impacting schedule. The S-curve in Exhibit 15 indicates that by utilizing DBF/OM, there is a 65-percent probability that the project will be completed in early December 2025.

The schedule tornado charts in Figures 16 and 17 depict the expected value (not modeled value) pre-response (red bars) and post-response (green bars) impact of the top risks affecting the project schedule.

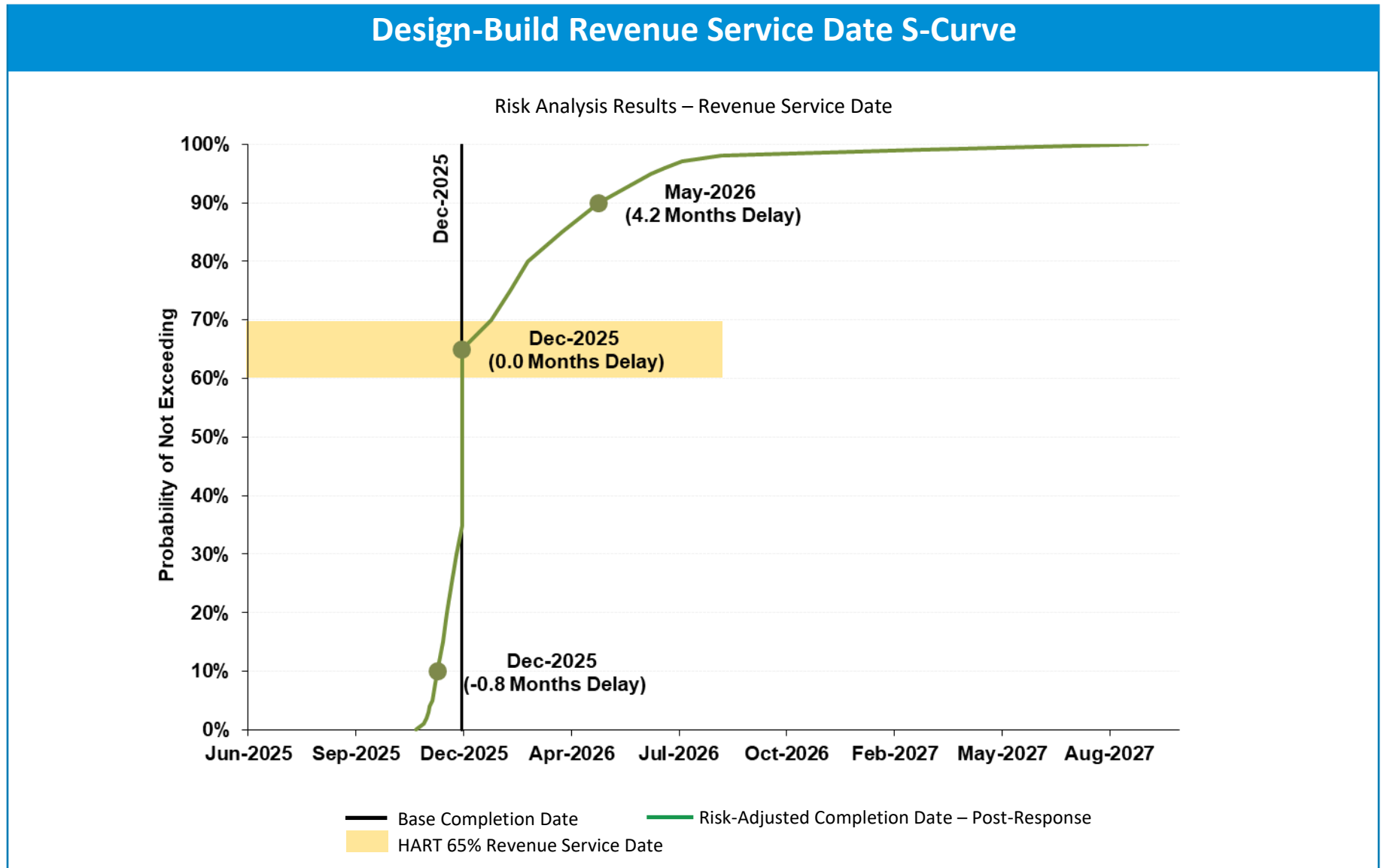
Risks in the tornado diagram are ranked in descending order, with the largest risks at the top of the diagram. Risk names are listed along the vertical axis, and the expected impact (in months) of the risk is shown along the horizontal axis. The expected value effect of each risk is calculated as the product of the risk's probability of occurrence and the risk's schedule impact as identified by the workshop experts.

While there are a mixture of risks and opportunities related to schedule shown in Figure 16 for DB delivery, Figure 17 shows the mixture of risks and opportunities offsetting the additional time associated with procurement for DBF/OM (P3) delivery.

O&M Schedule Risks

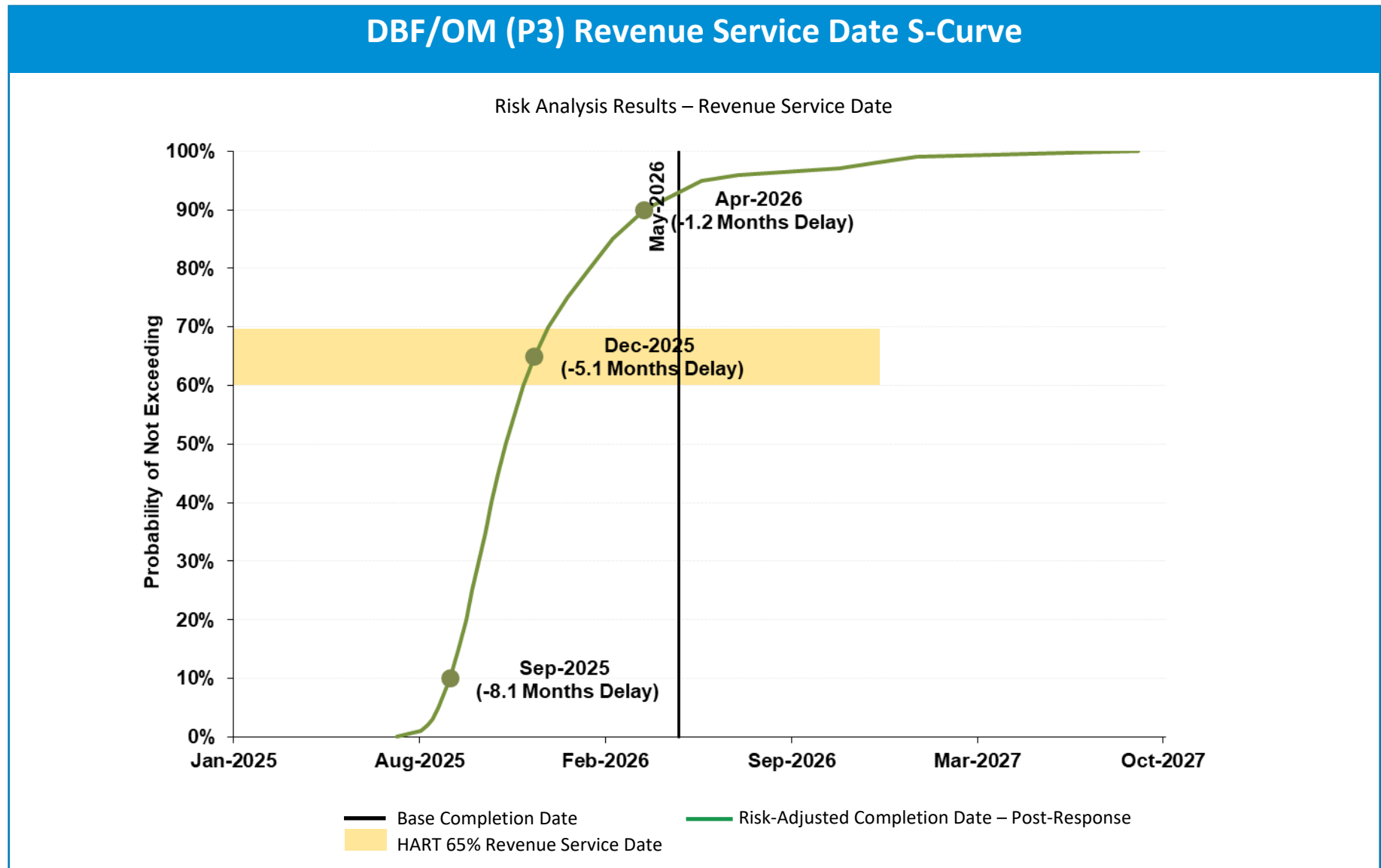
As mentioned earlier, O&M risks were not specifically modeled during this exercise, however they were discussed in conjunction with understanding the impacts of each delivery method. Because O&M occurs over various time periods for interim and full operations, there is the potential to achieve small efficiencies under a DBF/OM (P3). Specifically, it may be possible for a DBF/OM (P3) developer to phase the capital construction of the CCGS to ensure that the systems installation and then testing and commissioning are taking place beginning in East Kapolei and proceeding toward Ala Moana. If the project is delivered as a DB, separate contractor teams will be responsible for completing the capital construction of CCGS, installing the systems equipment, and initiating testing and commissioning, with a complicated interface making it less likely that the schedules can be condensed and overlapped.

Exhibit 14



Source: HART Risk Assessment Workshop, June 2018

Exhibit 15



Source: HART Risk Assessment Workshop, June 2018

Exhibit 16

Top Risks Impacting Schedule Tornado Chart – DB (YOE \$, Millions)

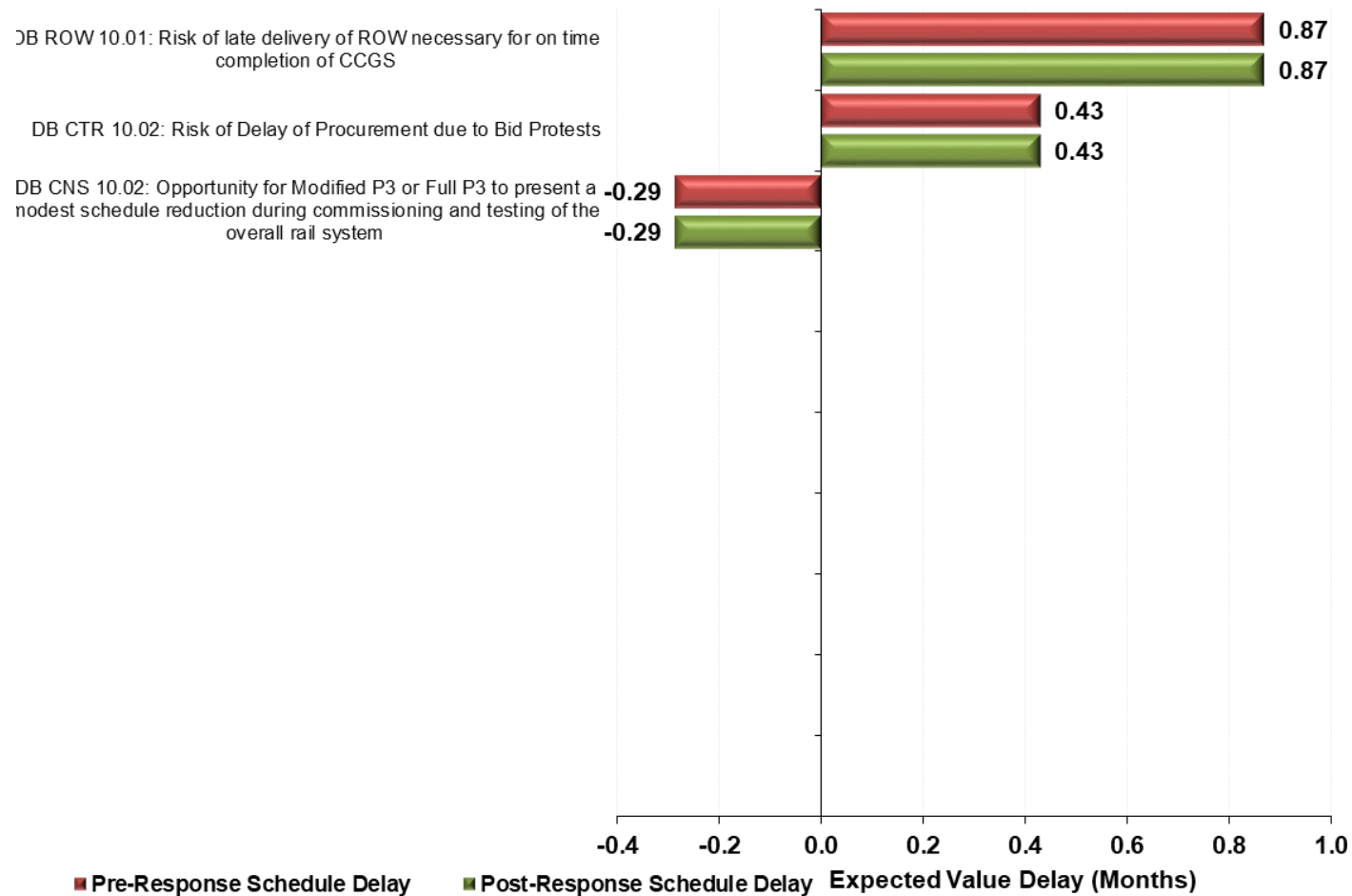
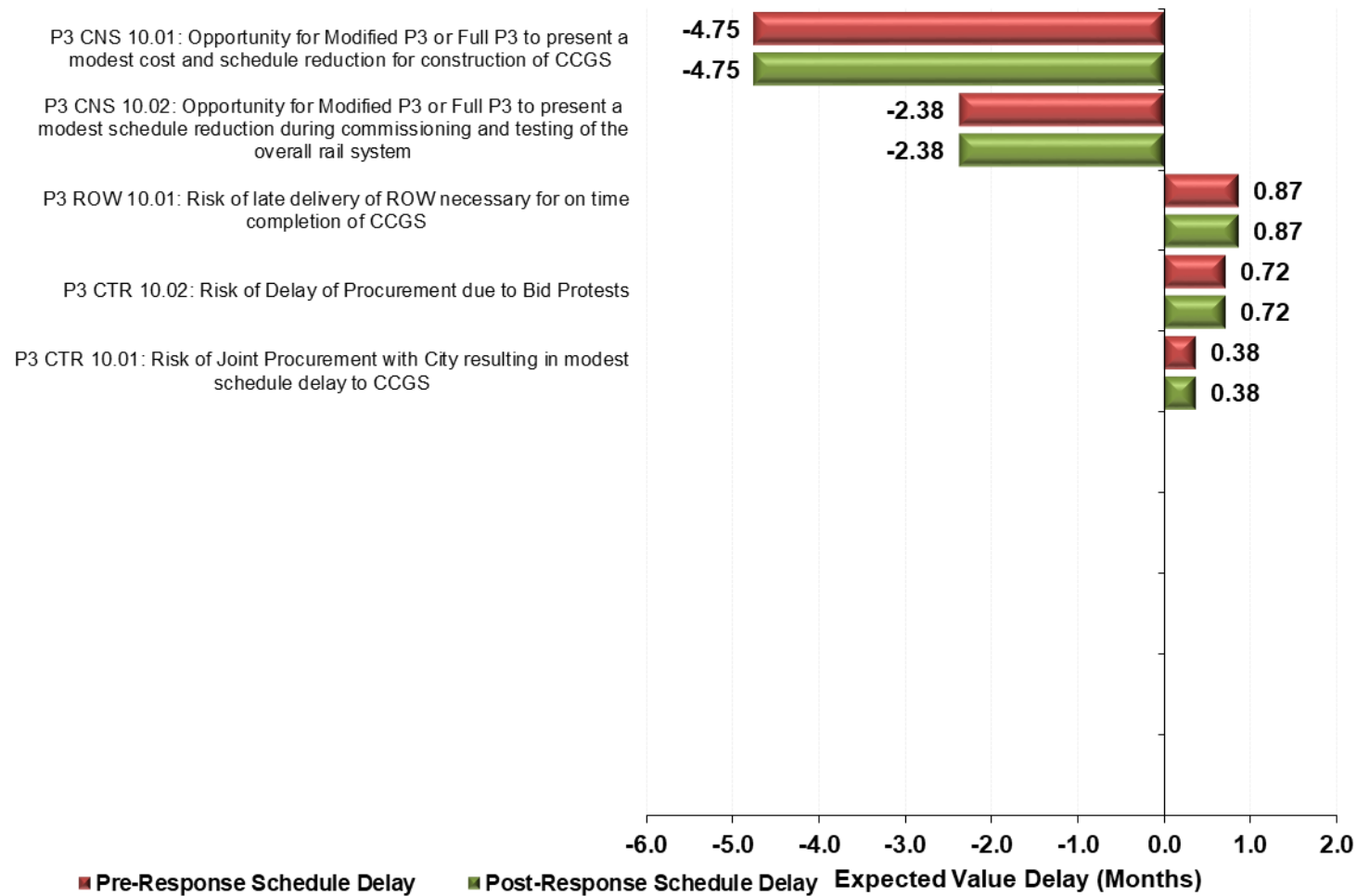


Exhibit 17

Top Risks Impacting Schedule Tornado Chart – DBF/OM (YOE \$, Millions)



Summary: Comparative Benefits and Risks of DBF/OM Project Delivery

The results of the Risk Workshop confirmed the potential of DBF/OM delivery for CCGS and PHGTC construction and for operations and maintenance to reduce capital costs by approximately \$50 million for HART to complete the H RTP, as well as allow for a potential reduction of over \$300 million in long-term O&M costs for the City. Both DB and DBF/OM project delivery are expected to allow HART to complete the project and meet the December 2025 scheduled start of Full Revenue Service.

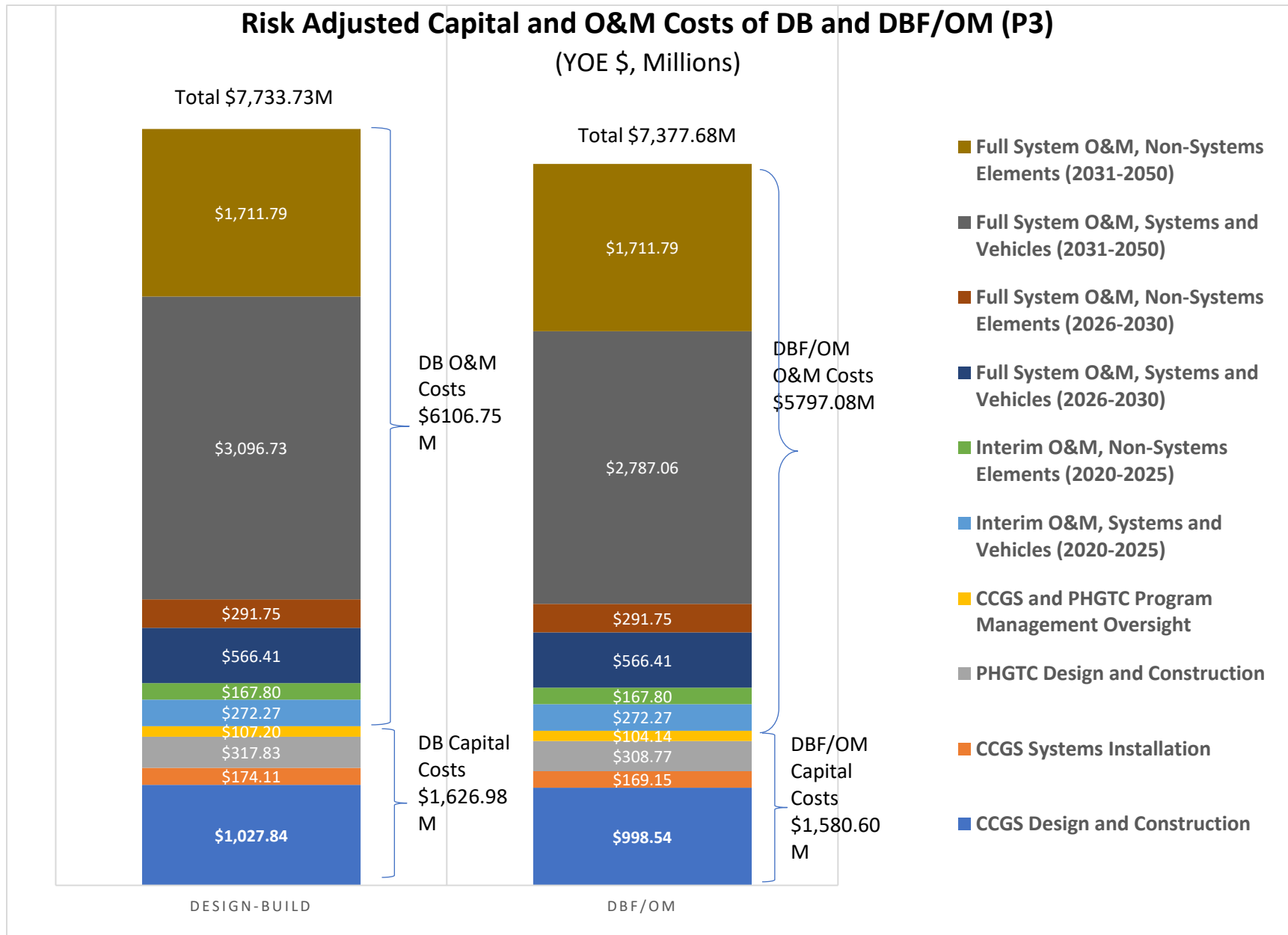
These cost savings are attributable chiefly to DBF/OM delivery affording HART and the City with:

- Opportunity to attract greater competition among a broader set of bidders
- Efficiencies in project oversight and implementation by packaging design and construction of City Center with Pearl Highlands
- Securing high levels of professional expertise with greater ability to manage complex rail projects and to enhance the technical capacity of HART and City staff
- Transferring most of the interface risk to the P3 Partner for completion of design and construction of the City Center segment, with enhanced coordination for completion of systems elements under a single contractual structure
- Providing fiscal incentives and performance requirements that serve to encourage completion on budget and on schedule
- Incorporating long-term operations and maintenance and capital asset replacement into a P3 concession, with associated opportunity to negotiate better pricing for such services
- Accelerating testing and acceptance

Benefits Related to Costs

Exhibit 18 and the two tables below summarize the capital and operations and maintenance costs of DB and DBF/OM implementation over the 2020 – 2050 concession period. As shown, the cost associated with DB implementation and O&M totals \$7,733.73 million in YOE dollars (\$4,726.89 million in 2018 dollars). For DBF/OM implementation and O&M, costs total \$7,377.68 million in YOE dollars (\$4,553.43 in 2018 dollars). Of the total cost for the 30-year period, approximately 20% is attributable to capital costs associated with design and construction, while the remaining 80% is attributable to 30 years of continued operations and maintenance over the 2020 – 2050 period.

The tables below summarize the capital and O&M costs for DB and DBF/OM implementation and ongoing operation and maintenance over the 2020 – 2050 period. Costs are presented in both inflated (YOE) dollars and in 2018 dollars.



As shown in the tables, DBF/OM delivery is projected to provide a cost reduction of \$356.05 million over the 2020 – 2050 period compared to design-build delivery. Of this total, \$46.38 million is attributable to the lower capital cost made possible through efficiencies and risk transfer to the P3 Partner associated with design and construction of the CCGS and PHGPS and associated reduction in program management and systems costs. These cost savings would accrue to HART over the 2020 – 2025 construction period leading to implementation of full revenue service. The additional \$309.67 million in cost savings would accrue to the City over the 2030 – 2050 period of the P3 concession as a result of the opportunity to negotiate lower costs for continued systems-related O&M.

TOTAL CAPITAL AND O&M COSTS, 2020 – 2050 (YOE \$, MILLIONS)				
Total Costs, by Element	2020-2025	2026-2030	2031-2050	Total 2020-2050
DB				
Capital Costs (CCGS and PHGPS)	\$1,626.98			\$1,626.98
O&M for Systems and Vehicles	\$272.27	\$566.41	\$3,096.73	\$3,935.41
O&M for Non-Systems Elements (City)	\$167.80	\$291.75	\$1,711.79	\$2,171.34
TOTAL, DB	\$2,067.05	\$858.16	\$4,808.52	\$7,733.73
DBF/OM (P3)				
Capital Costs (CCGS and PHGPS)	\$1,580.60			\$1,580.60
O&M for Systems and Vehicles	\$272.27	\$566.41	\$2,787.06	\$3,625.74
O&M for Non-Systems Elements (City)	\$167.80	\$291.75	\$1,711.79	\$2,171.34
TOTAL, DBF/OM (P3)	\$2,020.17	\$858.16	\$4,498.85	\$7,377.68
Net Savings from DBF/OM (P3)	\$46.38	\$0.00	\$309.67	\$356.05

TOTAL CAPITAL AND O&M COSTS, 2020 – 2050 (2018 \$, MILLIONS)				
Costs, by Element	2020-2025	2026-2030	2031-2050	Total 2020-2050
DB				
Capital Costs (CCGS and PHGPS) (YOE \$)	\$1,626.98			\$1,626.98
O&M for Systems and Vehicles	\$224.02	\$339.06	\$1,270.82	\$1,833.90
O&M for Non-Systems Elements (City)	\$148.94	\$223.41	\$893.63	\$1,265.98
TOTAL, DB	\$1,999.97	\$562.47	\$2,164.45	\$4,726.89
DBF/OM (P3)				
Capital Costs (CCGS and PHGPS) (YOE \$)	\$1,580.60			\$1,580.60
O&M for Systems and Vehicles	\$224.02	\$339.06	\$1,143.74	\$1,706.85
O&M for Non-Systems Elements (City)	\$148.94	\$223.41	\$893.63	\$1,265.98
TOTAL, DBF/OM (P3)	\$1,953.59	\$562.47	\$2,037.37	\$4,553.43
Net Savings from DBF/OM (P3)	\$46.38	\$0.00	\$127.08	\$173.46

Benefits Related to Schedule

While the procurement of services under a DBF/OM is more complex and will require up to 4 months of additional time to complete, the results of the risk assessment confirm that offsetting opportunities exist to offset the longer procurement process. These opportunities are provided through the ability to reduce the length of the construction period for City Center through more efficient coordination of capital construction with systems installation. Further opportunities to reduce schedule are provided through overlapping construction with commissioning and testing.

Potential Risks Associated with Cost and Schedule

There are four key risks associated with both cost and schedule that should be considered. Unless proactively addressed, these issues could affect both procurement methods:

- Right of entry / ROW access and property acquisition
- Resolution of issues with FTA in securing approval of the Recovery Plan
- Preparation for O&M and capital asset replacement
- Potential need for off-ramps or ability to end DBF/OM procurement and revert to DBOM or DB for implementation.

Right of Entry / ROW Access and Property Acquisition

While right-of-entry and ROW acquisition are essential for completion of both alternatives on time and on budget, and while the risks of delays are attributable to and the responsibility of HART (financially and with regards to resolution), right-of-way related issues could potentially have a differential impact on the DBF/OM (P3) partner than on a DB contractor. The DBF/OM (P3) partner could likely have a workaround while ROW is being secured. However, if key parcels on the critical path are not available, this could delay and require remobilization of certain work elements by the P3 contractor. HART recognizes the criticality of this issue and has taken steps to mitigate this potential effect. These actions include the development of Advanced Utility Relocation packages as well as the establishment of a ROW task force to focus management attention on ROW acquisition and to accelerate the negotiation process and resolution of ROW related issues.

Resolution of Issues with FTA in Securing Approval of the Recovery Plan

Another potential risk that affects both delivery alternatives is securing approval by FTA of the H RTP Recovery Plan. Concerns about potential issues with receipt of FTA funding could dampen the enthusiasm of bidders under a DBF/OM (P3), as bidders are expecting a degree of surety regarding the availability of funds for repayment of costs. Once the project delivery method for CCGS and PHGTC is determined, HART will immediately commence updating the Project Recovery Plan and associated financial plan and will enter into consultation with FTA on any required updates to the Risk Refresh.

The use of a DBF/OM (P3) delivery approach could help to foster a positive working relationship with FTA in that it provides the opportunity to request procedural assistance from FTA with regard to various mechanisms that could enhance private sector involvement and interest, including the potential for accelerated receipt of FTA CIG funding. DBF/OM (P3) delivery also enhances HART's opportunity to bring the project in at or below budget and at or ahead of schedule.

Preparation for O&M and Capital Asset Replacement

There are two key issues that will need to be addressed regardless of the delivery approach. First, with the transition of the H RTP to the City for operations and maintenance, the City will be taking on responsibility to both staff and/or manage a new transit mode. HART and the City will need to work together to enhance the City's knowledge and comfort level with taking on this responsibility. Secondly, HART and the City should undertake development of a capital asset replacement program (CARP). If a DBF/OM is pursued, definition of such elements by HART and the City will provide a better basis for evaluating proposals submitted by potential DBF/OM partners. This program will be required by FTA, not just with respect to securing approval of the recovery plan, but in HART and the City's ongoing relationship and compliance with FTA requirements.

Potential Need for "Exit-Ramp"

While DBF/OM is anticipated to enhance vendor interest and competition, there is a risk that proposers may exceed the affordability cap reserved for the capital elements of the project. Exceeding the affordability ceiling could result from the proposer(s) pricing construction significantly above current independent cost estimates, and/or from proposers pricing financing costs higher than anticipated. Should construction costs be priced higher than expected, it is likely that the same situation – or even higher construction pricing – could occur under a design-build delivery owing to the likelihood of less competition. This would be a significant issue beyond the choice of project delivery method and would need to be addressed by scope changes or additional funding options. The risk assessment model assigns a relatively low probability of this situation occurring.

If pricing for the civil works elements came in significantly higher than anticipated owing to higher pricing for private financing, one consideration to address the issue would be to modify the delivery approach from DBF/OM to DB/OM, with HART and the City retaining responsibility for financing the DB/OM partner's construction work at a potentially lower cost of capital. However, it is presumed that the cost differential between public bond financing and private lending would be relatively insignificant. Reverting from DBF/OM to DB/OM would require the sale of additional bonds or other public finance options and could extend the project schedule, but would still retain certain advantages over DB. A key factor in considering this option is that DB/OM would not provide the level of rigor nor the "5-year tail" of capital availability payments meant to assure satisfactory project performance under the DBF/OM. Nonetheless, this potential approach would represent an effective "exit ramp" if pricing for the civil works exceeded the affordability cap and necessitated a change in approach.

Following release of RFP Part 2, priority-listed offerors would quickly build their respective financial models inclusive of making a preliminary affordability determination. The offerors would discuss their financial plans with HART in scheduled, confidential briefings imbedded in the procurement process. Over a period of 3-4 months, HART would be in a position to ascertain offerors' compliance with the affordability ceiling, potentially triggering a possible "exit ramp" to the DB/OM approach. This process would still allow adequate time in the procurement procedure for priority-listed offerors to adjust their bids accordingly.

Procurement Approach

HART is authorized to plan, design, develop, and construct the fixed guideway system and retains the power to make and execute contracts¹. The City and County of Honolulu (City) Department of Transportation Services (DTS) is authorized to plan, operate and maintain the “city’s multimodal transportation system.”²

The contemplated DBF/OM procurement method would, thus, involve contractual authority of two City agencies, HART and DTS. To the extent one agency cannot encroach on the Charter authority of another agency, but where the goods, services, and construction are to be procured by more than one public procurement units or agencies, as in the case of this P3 DBF/OM procurement, Hawaii Revised Statutes (HRS) Section 103D-802 allows for joint contracts between public procurement units.³

The cooperative agreement will be governed by Hawaii Administrative Rules (HAR) Chapter 3-128.

Authority for Design-Build-Finance/Operate-Maintain

HRS § 103D-303 allows for the procurement of goods, services, or construction that are either not practicable or not advantageous to the government to procurement by competitive sealed bidding, including through a request for proposals (RFP) using the design-build method.⁴ Under this authority, in 2011, the City awarded a design-build-operate-maintain (DBOM) contract for the core systems contract.

Under FTA’s 2007 “Notice of Establishment of Public-Private Partnership Pilot Program; Solicitation of Applications,”⁵ whether a DB, DBOM, or DBFOM, they are all “essentially a form of [PPP] procurement”; specifically, with regards to a DBFOM, the FTA noted that the DBFOM has long been recognized as a procurement option and that a DBFOM is like a DBOM, but also includes “the transfer of the financial risks to the design-builder during the contract period.”⁶ The DBFOM, along with a DB and DBOM, are all recognized as a PPP procurement delivery methodology by the FTA. HART has consulted with its legal advisers and is adequately confident that a DBFOM is permissible. Generally, HART has been advised that the evaluation of the legality of a DBFOM is primarily in light of procurement and related laws; that is, in light of the definition of “procurement,” under Hawaii State Public Procurement Code (Procurement Code), there is nothing that precludes having the offeror finance the project. The Procurement Code defines “procurement” as follows:⁷

“Procurement” means buying, purchasing, renting, leasing, otherwise acquiring any good, service, or construction. The term also includes all functions that pertain to the obtaining of any good, service, or

¹ See Revised Charter of the City and County of Honolulu (RCCCH) 1973 (2017 Edition) Sections 17-102 and -103.

² See RCCCH Section 6-1703.

³ HRS § 103D-802 **Cooperative purchasing authorized**. A public procurement may either participate in, sponsor, conduct, or administer a cooperative purchasing agreement for the procurement of goods, services, or construction with one or more public procurements.... The cooperative purchasing may include, but shall not be limited to, joint or multi-party contracts between public procurement units....

⁴ See HRS §103D-303(i).

⁵ FR Vol. 72, No. 12, Friday, January 19, 2007, p. 2584.

⁶ *Id.* at p. 2585.

⁷ HRS §103D-104

construction, including description of requirements, selection and solicitation of sources, preparation and award of contracts, and all phases of contract administration.

The analysis notes that there is nothing in the definition that precludes having the offeror financing the project, in part or whole. Whatever the financing structure, HART/City would still be “otherwise acquiring services or construction.”

Furthermore, the Procurement Code governs transactions defined as “procurements” regardless of the type of consideration is involved. That is, HRS § 103D-102(a) provides:

“(a) This chapter shall apply to all procurement contracts made by governmental bodies whether the consideration for the contract is cash, revenues, realizations, receipts, or earnings, any of which the State receives or is owed; in-kind benefits; or forbearance; provided that nothing in this chapter or rules adopted hereunder shall prevent any governmental body from complying with the terms and conditions of any other grant, gift, bequest, or cooperative agreement.”

Based on FTA’s discussions of DBFOM and review of multiple legal analyses provided on DBFOM procurement, HART believes there is sufficient basis to proceed with a DBFOM procurement.

Stipend

Payment of a fee (“conceptual design fee”), or sometimes called “stipend,” is authorized by HRS 103D-303(i). Section 1 (“Purpose Clause”) of the enacting Act 211 (2011) provided that conceptual design drawings as a part of Design-Build proposals “require a considerable initial investment” and thereby should be permitted.

HART contemplates including a stipend or “conceptual design fee” for the Design Build portion of the DBFOM, but recommends a method that has been used in other jurisdictions—that is, include an allowance line item in the price proposal, whereby the successful offeror pays the unsuccessful offerors (maximum of two (see below “2-Part RFP Process”)) their stipend, provided the unsuccessful offerors have met the minimum thresholds set forth in the RFP, which include at minimum (under the Procurement Code) the unsuccessful offeror having submitted a (technical) proposal and the proposal being responsive.

Two-Part RFP Process

For the DBF/OM Procurement, a 2-Part RFP procurement process will be followed in accordance with HRS §103D-303(i): (1) Part 1 will be issued to prequalify offerors to select a short list of “no more than three responsible offerors” prior to submittal of technical and price proposals; the short-listed offerors will comprise the “Priority-Listed Offerors” (PLO) with whom discussions can be held; (2) Part 2 RFP will be issued to the short-listed PLOs.

As indicated above, the DBF/OM procurement will be a joint procurement between HART and the City, with HART procuring the “Design Build” and the City procuring the “Operations and Maintenance.”

Core Systems Scope of Work

Many combinations and permutations of how the Core Systems scope of work should be integrated within a DBFOM were brain-stormed, analyzed, and argued. Having gone through the rigor, while the resulting options may not seem very much different from our current arrangement with our core systems contractor, there is a higher confidence that these are the best approaches.

In all scenarios, (1) the current core systems contractor will deliver all rolling stock in accordance with the requirements of the existing contract, inclusive of necessary testing and commissioning services; (2) the current core systems contractor will also procure, install, commission and certify all systems elements per the existing contractual obligations through Middle Street and provide all systems components for the City Center Guideway section, under the direction of HART.

The current core systems contractor will install, commission, and certify all systems elements for City Center Guideway segment, however, either under HART's direction or the P3 developer's direction. If the latter, this scope of work would need to be included in the RFP scope of work as a "sole source" or restrictive specification. HART explored many different options so that a "sole source" or restrictive specification would be avoided; but to the extent that the first 15 miles will have been installed and commissioned by the current core systems contractor using its proprietary signaling system, it was concluded that it would not be reasonable, practicable, advantageous – and mainly, technically and financially feasible—to change out the entire system. Therefore, HART will prepare a sole source/restrictive specifications request for approval (for the design-build portion) of sole source/restrictive specifications.

Procurement Schedule

HART and the City will jointly develop a final procurement schedule. Currently, the RFP Part 1 (Statement of Qualifications) is scheduled to be issued late August 2018. The Draft RFP Part 2 is scheduled for release in late October 2018 and the Final RFP Part 2 in January 2019, with anticipated award in late 2019. It is important to recognize that the procurement process for a P3 program takes somewhat longer than the basic design-build process. The Risk Assessment outcome, however, projected that the overall project schedule – including design and construction – will result in a shorter overall project schedule – from RFP Part 1 release to Revenue Service Date. This is a function of the inherent aspects of a P3 program, including the overall efficiencies of having a single contractor oversee and coordinate both the civil and systems construction and the fact that the P3 partner would be self-financing the design/construction process. This becomes a significant inducement for the developer to accelerate the project construction schedule.